FACTORY

MANAGEMENT AND MAINTENANCE

JANUARY 1949

SPECIAL REPORT ON MATERIALS HANDLING

Better Materials Handling — for Cutting Costs and Increasing Productivity 65

How Eleven Companies Are Cutting Handling Costs 66

Ford Motor Company, 66 • Zenith Radio Corporation, 73 • The B. F. Goodrich Co., 76 • Ingersoll Steel & Disc Div., Borg-Warner Corp., 80 • General Motors Corporation, 83 • Cadillac Motor Car Div., 84 R. G. LeTourneau, Inc., 87 • Wagner Electric Corporation, 90 • National Cash Register Co., 93 • Standard Motor Company, Ltd., 98 • Yale & Towne Mfg. Co., 104

Simple Installations That Solved Handling Problems 107

EDITORIAL

What Are *Your* Chances If There Are No Profits? preceding 65

LABOR RELATIONS

How the Labor Law Should Be Amended 120
What Labor Did in the Election — and What It Will Do 134

PRODUCTION

New Layout Cuts Floor Space, Triples Capacity in Small Plant 112
Adaptation of Gantt Chart to Continuous Operations 128

MAINTENANCE

Better Methods for Janitors Result From Cost Analysis 114
15 Ways to Cut Cost of Gas Fuel 117
The Cost of Maintenance in 75 Industries following 128
How Canadian Plants Are Meeting a Power Shortage 131
Repair Shop Productivity Jumps 20 Per Cent With New Layout 132
An Instruction Manual in Plant Engineering 138
Ground Detectors for Electrical Systems — *Maintenance Data Sheets* 148

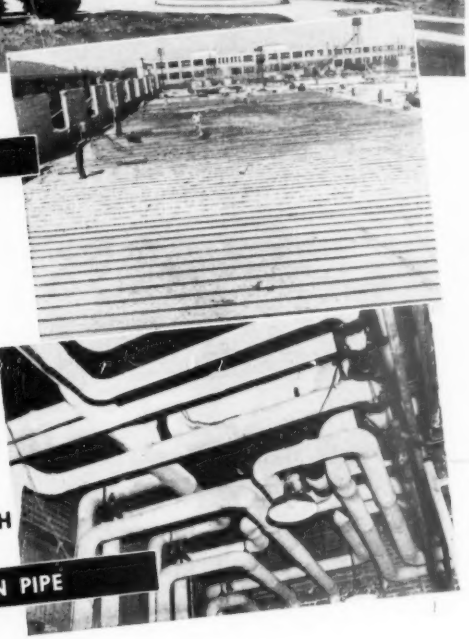
INDUSTRIAL RELATIONS

Why Our Girls Really Like Their Uniforms 119
Recordings Help Foremen Improve Industrial Relations Techniques 129
Jeep Rushes Safety Equipment to Any Emergency 130

DEPARTMENTS

Operating Shorts, 142 • Looking Ahead in Labor, 145 • Looking Ahead in Business, 146 • What's New in Equipment, 152 • You Want to Know, 224 • Significant Labor Developments, 232 • They Say and Do, 246 • Behind the Byline, 262 • Books and Booklets, 268 • On the Calendar, 272 • Catalog Service, 280

A McGRAW-HILL PUBLICATION



MORE BIG INDUSTRIAL INSTALLATIONS

4

FOR RADIANT HEATING WITH BYERS WROUGHT IRON PIPE

The Chase Bag Company recently celebrated its 100th anniversary by completing three new factories and a factory addition. All of these modern structures have radiant heating, and more than 25 miles of Byers Wrought Iron pipe, in sizes from $1\frac{1}{4}$ to 5-inch, were used in the various installations for the heating coils and for auxiliary lines.

MAXIMUM EFFICIENCY—MAXIMUM COMFORT

The illustrations show typical design and procedure. Pipes were welded into grids for manufacturing, warehouse and garage areas, formed in sinuous coils for second floor areas. Hot water is used for heating. The building was divided into zones with individual circulators used for each. Shortly after one building was completed, outside temperatures dipped to 15° below. Comfort conditions within the plant were reported as "excellent."

UNIQUE PROPERTIES

The almost universal use of wrought iron pipe for radiant heating results from engineer recognition of its unusual advantages. It is easily formed and welded. It has high heat emission. It expands and contracts at practically identical rates with concrete, avoiding the danger of thermal cracks, and loss of bond. Finally, its superior corrosion resistance has been conclusively demonstrated.

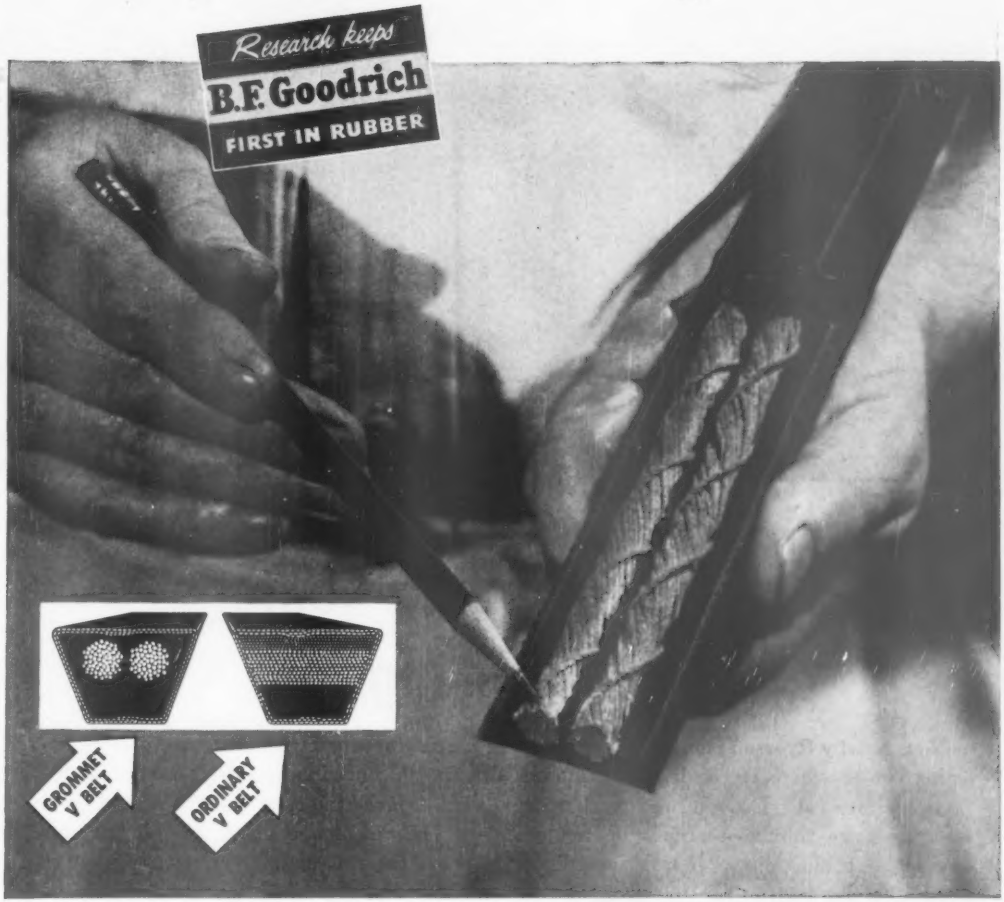
HELPFUL LITERATURE

Our bulletin, "Byers Wrought Iron for Radiant Heating", gives complete technical information on calculation, design, and layout. Ask for a copy.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Salt Lake City, Seattle, San Francisco. Export Division: New York, N.Y.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS



This V belt will cut your belt costs 20% to 50%

Only B.F.Goodrich makes the grommet belt—there's no other like it

THE B. F. Goodrich patented grommet belt lasts 20 to 50 per cent longer but costs no more than an ordinary V belt.

A grommet is *not a cable.* It is made by winding heavy cord *on itself* in an endless loop. (Cables are simply twisted cords; ends must be overlapped or spliced.)

Better than multiple cords. In a grommet belt all the cords work *all the time.* There are no cords in the *center* of the belt — which in an ordinary belt don't pull their share of the load.

More flexible. There is no splice, no stiff section where cords overlap. (85% of failures of ordinary belts occur in overlapped sections.) BFG belts have twin grommets, no fabric or plies in the middle of the belt that stiffen it and generate heat.

Stand shocks. Grommet belts run cooler, are stronger, have more *elasticity* but less *permanent* stretch than any other kind of belt. They stand sudden shock. Both laboratory and field tests have proved that they outlast all others, especially on hard drives.

Large sizes only. At present grommet belts are made only in largest sizes (D and E sections). Later, other sizes may be made.

More information. If you buy or use large-size V belts, don't do without the advantages grommet belts can give you. Talk to your BFG distributor. Or write, if you wish, for leaflet 2170. Address Dept. L-10, *The B.F.Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

Here's a Tubing Center Worth Looking Into

Your nearby Ryerson plant is a handy tubing center where large, diversified stocks await your call. Do you need mechanical or pressure tubing—seamless or welded; stainless tubing, pipe or pipe fittings? Practically any tubing requirement can be shipped on short notice. You save time because Ryerson has a wide range of sizes at plants from coast to coast. Probably there's a Ryerson tubing center near you.

In addition to quick delivery, Ryerson tubing service often gives an added bonus of time saved in your shop. All Ryerson tubing meets high standards of size accuracy, concentricity, straightness and finish. Machining time is cut to a minimum.

There's an experienced tubular products specialist at your Ryerson plant—ready to work with you on any problem of application or fabrication. We urge you to send us your tubing inquiries and orders.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

Do you have a copy of the Ryerson Tubing booklet just off the press? Its 32 pages are packed with useful information on tubular products, both carbon and stainless—tolerances, mechanical properties, helpful suggestions on grades and sizes, Ryerson stocks, etc. Write for yours today. ▶

PRINCIPAL PRODUCTS: Bars · Structurals · Plates · Sheets · Tubing · Allegheny Stainless · Alloy Steels · Reinforcing · Babbitt · Machinery & Tools · etc.

RYERSON STEEL

FACTORY

MANAGEMENT and MAINTENANCE

JANUARY, 1949

ALFRED M. STAEHLE, Publisher

L. C. MORROW, Editor

LEWIS H. URQUHART, Managing Editor

ASSOCIATE EDITORS
G. A. Van Brunt, Carroll W. Boyce, P. C. Woodward, M. J. Murphy

FIELD EDITORS
Carl G. Wyder, *New York;* William S. Wheeler, *Chicago;* Charles R. Schubert, *Cleveland*

ASSISTANT EDITORS
Robert A. Dilley, Kay White, Faye Farnham

LAYOUT EDITORS
George L. Smith, Robert J. Tucker

CONSULTING EDITORS
A. H. Mogensen, H. P. Dutton, Charles B. Gordy

Washington Bureau
George E. Doying, Jr., *Director*
J. M. Gambatese, *Labor*

McGraw-Hill Department of Economics
Dexter M. Keezer, *Director*

McGraw-Hill World News
John F. Chapman, *Editorial Director*

McGraw-Hill Research
John C. Spurr, *Director*

H. R. Mathias, *Sales Manager*

•

McGRAW-HILL PUBLISHING CO., INC.

James H. McGraw (1860-1948), Founder.

JAMES H. McGRAW, Jr., President; CURTIS W. McGRAW, Vice-President and Treasurer; EUGENE DUFFIELD, Executive Assistant for Publications; NELSON BOND, Director of Advertising; JOSEPH A. GERARDI, Secretary; J. E. BLACKBURN, Jr., Director of Circulation.

Factory Management and Maintenance, January, 1949, Vol. 107, No. 1. Published monthly, McGraw-Hill Publishing Co., Inc., 418 West 25th Street, New York 1, N. Y. Entered as second-class matter July 22, 1948, at the post office at New York, N. Y., under the Act of March 3, 1879. Address all communications to the editorial, executive and circulation offices, 330 West 42nd Street, New York 18, N. Y.

Factory Management and Maintenance is a consolidation of Factory and Industrial Management (including "Factory") and Maintenance Engineering. Subscription rates—United States, U. S. Possessions: $3, 1 year; $4, 2 years; $5, 3 years. Canada: $4, 1 year; $6, 2 years; $8, 3 years. Pan-American countries: $8, 1 year; $10, 2 years; $12, 3 years. Other countries: $15, 1 year; $25, 2 years; $30, 3 years. Single copies, 35c; in Latin America, 75c; in all other countries, $1.50. Factory Management and Maintenance solicits subscriptions only from production, maintenance, and management executives and engineers in manufacturing plants. Please indicate company connection and title on all subscription orders. Cable address, "McGraw-Hill, New York." Member A.B.P., Member A.B.C.

Copyright 1949 by McGraw-Hill Publishing Co., Inc. All rights reserved.

District Managers: G. E. Pomeroy, Boston; A. R. Martin, R. P. Rose, Chicago; R. C. Greiner, Cleveland; T. W. Van Winkle, Detroit; J. S. Cawley, R. E. Sawyer, New York; E. Macaulay, Philadelphia; R. W. Garrison, Pittsburgh; W. R. Pankow, St. Louis. Other offices at Atlanta, Los Angeles, San Francisco, Washington, and London.

World News offices: London, Paris, Berlin, Moscow, Prague, Shanghai, Bombay, Mexico City.

SPECIAL REPORT

Better Materials Handling—for Cutting Costs and Increasing Productivity 65
How Eleven Companies Are Cutting Handling Costs 66
Ford Motor Company 66
Zenith Radio Corporation 73
The B. F. Goodrich Company 76
Ingersoll Steel & Disc Division, Borg-Warner Corp. 80
General Motors Corporation 83
Cadillac Motor Car Division 84
R. G. LeTourneau, Inc. 87
Wagner Electric Corporation 90
National Cash Register Company 93
Standard Motor Company, Ltd. 98
Yale & Towne Manufacturing Company 104
Simple Installations That Solved Handling Problems 107

EDITORIAL

What Are *Your* Chances If There Are No Profits . . . preceding 65

LABOR RELATIONS

How the Labor Law Should Be Amended 120
What Labor Did in the Election—and What It Will Do 134

PRODUCTION

New Layout Cuts Floor Space, Triples Capacity in Small Plant . 112
Adaptation of Gantt Chart to Continuous Operations 128

MAINTENANCE

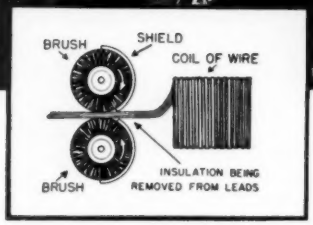
Better Methods for Janitors Result From Cost Analysis . . . 114
15 Ways to Cut Cost of Gas Fuel 117
The Cost of Maintenance in 75 Industries . . . . . following 128
How Canadian Plants Are Meeting a Power Shortage 131
Repair Shop Productivity Jumps 20 Per Cent With New Layout . 132
An Instruction Manual Improves Plant Engineering Efficiency . 138
Ground Detectors for Electrical Distribution Systems—*Maintenance Data Sheets* 148

INDUSTRIAL RELATIONS

Why Our Girls Really Like Their Uniforms 119
Recordings Help Foremen Improve Industrial Relations Techniques 129
Jeep Rushes Safety Equipment to Any Emergency 130

DEPARTMENTS

Operating Shorts 142
Looking Ahead in Labor . 145
Looking Ahead in Business 146
What's New in Equipment 152
You Want to Know . . 224
Labor Developments . . 232
They Say and Do 246
Behind the Byline 262
Books and Booklets . . . 268
On the Calendar 272
Catalog Service 280



Schematic Drawing of typical Wire Stripping Operation.

Wagner Electric Corporation Strips Wires Faster with Osborn Brushes, insures solid solder contact of rotor leads in commutator

STRIPPING formvar enamel insulation from copper lead wires in rotor fields to insure solid solder contact in the commutator is a feature performance at the Wagner Electric Corporation, St. Louis, Mo. Principal stars of the "show" are Osborn Ringlock Brushes with their cost-cutting act of stripping lead wires free of all insulation in a matter of seconds . . . with lead ends "clean as a whistle" for automatic soldering.

A special wire stripping machine provides a fixture in which a rotor is placed with wires extended and rotated at 8 R. P. M., forcing the wires between counter rotating Osborn Ringlock Brushes, revolving at 3450 R. P. M., that strip approximately 1 in. of insulation, 1½ in. from the end. Rotor is then removed from the fixture and the lead wires trimmed to length within the cleaned area.

This is just one of hundreds of industrial applications in which Osborn Power-Driven Brushes are playing a stellar role. If you are faced with rising production costs it will pay you to investigate. There is no obligation.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue *Cleveland, Ohio*

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES

You're sure it's the

RIGHT LIGHT

...if it's "via Graybar"!

That's because Graybar has studied, planned, and supplied lighting systems of every type—and because a Graybar Lighting Specialist can recommend impartially the exact lighting equipment for each of your needs . . . indoor and outdoor, for plant or product. Graybar has the biggest selection of lamps and lighting units available anywhere!

Local Stocks of Lamps

Graybar distributes all types and sizes of G-E lamps—fluorescent, filament, mercury—clear, frosted, colored—glow lamps, heat lamps, germicidal lamps, flashlight lamps. Stocks are maintained at Graybar warehouses throughout the nation so you can get prompt delivery anywhere.

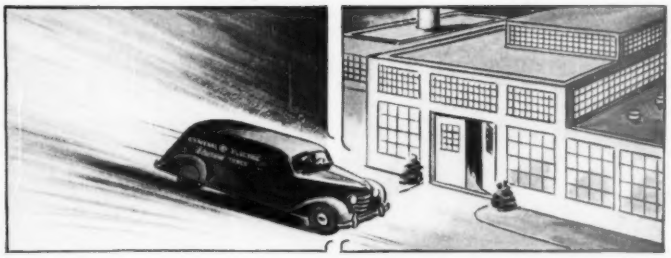
EVERYTHING FOR LIGHTING

In addition to working with you or your electrical contractor to analyze your lighting requirements scientifically and plan the best system, Graybar will provide, besides the fixtures and lamps, all the wire, conduit, switches, and ballasts you may need. All are first-quality products of leading manufacturers.

Other Electrical Systems

Graybar offers you similar, all-inclusive system-planning and supply service for ventilation, signaling and intercommunication, power, and plant or product wiring—plus all types of portable electric tools. Ask your Graybar Representative for information about anything electrical, or call our nearest office. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.* 4895

IN OVER 100 PRINCIPAL CITIES



YOUR PHONE-CALL WILL BRING FAST DELIVERY...

right to your factory door, by your local G-E tube distributor or dealer

—OF RECTIFIER PHANOTRONS

—and all other electronic tubes for replacement use!

RECTIFIER tubes take a-c power from your feed-wires and convert it into d-c. That's basic to operation of your constant-torque, variable-speed motors—your capacitor-discharge welders—much other equipment in your plant.

Speedy replacement of these phanotrons, when new tubes are needed, may save you profitless hours from stalled production machines.

Your source for new rectifier tubes, from .25 to 75 amp average current—or thyratrons, ignitrons, power tubes, other types—is *your nearby G-E tube distributor or dealer.* He's your fastest source; he delivers tubes out of stocks on hand. He's your best source; the tubes are fully covered by G-E warranty, represent latest design and current output by the leader in industrial-tube manufacture.

Call your G-E distributor or dealer today! Establish *now* a contact that will protect you when future tube-replacement emergencies occur! *Electronics Department, General Electric Company, Schenectady 5, New York.*

GL-5558/FG-32
2.5 amp average current.

GL-5561/FG-104
6.4 amp average current.

FG-280
6.4 amp average current.
Steel-jacket design.

You can put your confidence in—

GENERAL ELECTRIC

180-HA25-8850

BAKER TRUCK— unloading zinc pigs saves Hubbard & Co. 16½ man hours per car

Baker Articulated Fork Truck leaving box car with load of zinc pigs. Hubbard & Company saves 7 to 8 hours per car for each of 3 men on this operation.

At the Emeryville, California plant of Hubbard and Company, manufacturers of pole line hardware and electrical construction material, four Baker trucks cut handling costs to a minimum. A Baker Low Lift and two Baker Hy-Lift trucks expedite movement of material from process to process in the plant, while a Baker ARTICULATED Fork Truck unloads incoming material, conserves space by tiering, and speeds loading of highway trucks.

Baker Fork Truck conserves warehouse space by high tiering and speeds loading of finished products on highway trucks.

The ARTICULATED fork truck has made possible a saving of 16½ man hours per car in unloading zinc pigs. This work formerly required four men, whereas now one man operator, with the ARTICULATED Baker truck does the same work in 2½ hrs. time. Thus releasing three men for more productive work.

A Baker material handling engineer will gladly show you how to get more for your man-power dollar by mechanized handling.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Co.
2178 WEST 25th STREET • • • • CLEVELAND, OHIO
In Canada: Railway & Power Engineering Corp., Ltd.

See us at the 3rd National Materials Handling Exposition, Philadelphia, Jan. 10-14, 1949

Baker INDUSTRIAL TRUCKS

Through the Pickle on Link-Belt Overhead Trolley Conveyors

Panels for the Lustron Home Get Their Faces Washed in Largest Automatic Machines

Engineered for vast production, Lustron Corporation's new plant surpasses any existing porcelain enameling plant in total size, as well as in size of individual units. Metalwash Machinery Company supplied the largest continuous, automatic spray pickling machines ever built. Link-Belt Overhead Trolley Conveyors, 850-ft. long each, carry panels up to 8 ft. high through washing and rinsing baths, from loading to unloading zones. A Link-Belt Overhead Trolley Conveyor also handles sanitary ware thru a similar pickling operation. Five complete separate Link-Belt Overhead Trolley Conveyors are required to handle ware that is pickled in this vast plant.

In many mass-production industries, Link-Belt Overhead Trolley Conveyors supply the simplest, most efficient transportation of parts or products through various processes. They can be arranged for mono- or multi-plane service, for light, medium or heavy loads, for constant or variable speeds. In short, to suit your special application!

Call the nearest Link-Belt office. Ask for a Materials Handling Engineer. His suggestions are valuable. Send for literature.

OTHER TYPES OF LINK-BELT CONVEYING MACHINERY

Belt Conveyors	Chain Conveyors	Oscillating Conveyors
Screw Conveyors	Trolley Conveyors	Flight Conveyors
Bulk-Flo Conveyors	Apron Conveyors	Bucket Elevators
		Bucket Carriers

11.281

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

LINK-BELT

CONVEYING MACHINERY

Get the pump with all these features:

THE *Electrifugal* PUMP

1. Pump and motor in ONE rigid frame, on ONE shaft, to eliminate alignment troubles.

2. Drip-proof motor specially designed by Allis-Chalmers for efficient pumping service.

3. Bronze wearing rings easily and economically replaceable for long pump life.

4. Generous packing — five or more rings, reduce leakage and frequent servicing.

5. Plastic water seal gives positive control, and requires a minimum of attention.

QUICK INSTALLATION — It's a complete, low-cost pumping "package" — ready to hook up and put into service for a wide range of applications. Can be mounted in any position — fits into close quarters. Made to handle most liquids, with capacities from 15 to 1400 gpm, heads to 500 ft.

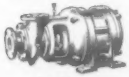
HIGH EFFICIENCY — Pump and motor are engineered and built together as a smooth-working team, and Allis-Chalmers takes undivided responsibility for performance. Every Electrifugal pump is run and tested at the factory for efficiency, capacity and head.

IMMEDIATE DELIVERY — Many sizes of Electrifugal, PEDRIFUGAL and SS UNIT pumps are now in stock at convenient points. Phone or wire your nearest Allis-Chalmers office or dealer for latest information on stocks and deliveries. For description of the complete line of A-C centrifugal pumps, to 600,000 gpm, ask for Bulletin B6059D. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2382

PEDRIFUGAL

The new A-C pump for flexible Texrope V-belt drive. Capacities to 500 gpm, heads to 100 ft.



SS UNIT

Close-coupled pump and motor units, made in 234 standard ratings, to 2500 gpm.

Electrifugal, Pedrifugal, SS Unit and Texrope are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

Temporary Outdoor Storage

Don't half-mechanize...

GO ALL THE WAY

in Materials Handling

Going all the way means using power industrial trucks of the RIDDEN type. It means putting speed into your wheels—*3 times faster* than a hand-led truck.

It means handling *much larger* loads—loads that can be efficiently and safely high-tiered, or wheeled outside the department entirely, yet as accessible as if they had remained there.

It means *savings in man-hours*—savings that are vital with common labor scarce and almost prohibitive in cost.

Transportation is the product of tonnage by time. Why not save both instead of one? Don't ask your walking-talking operator to be pushed around by a machine—*put him on it, where it's safe; make him master of the whole job.*

Elwell-Parker builds power industrial trucks of the RIDDEN type *only.* Have an EP man show you how "Going All The Way" will substantially cut your materials handling costs. The Elwell-Parker Electric Company, 4323 St. Clair Ave., Cleveland 14, O.

FREE BOOKLET ON SCIENTIFIC MATERIALS HANDLING

Send for a copy of "Industrial Logistics"

VISIT OUR EXHIBIT

NATIONAL MATERIALS HANDLING SHOW
PHILADELPHIA—JAN. 10-14, 1949

BOOTHS 615, 616, 713, 714

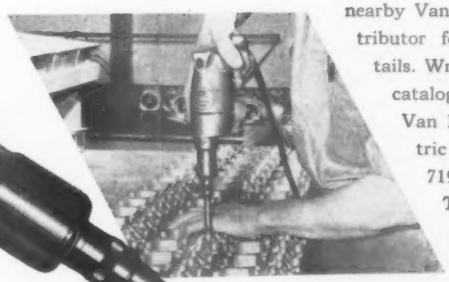
ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

3 OF A KIND TO CUT PRODUCTION COSTS

HOLGUN*
Drills holes up to ¼" diameter in steel, up to ½" in hardwood

DONNELLY ELECTRIC

TAPGUN*
Cuts threads up to 3/16" in mild steel, up to 5/16" in cast iron, up to 3/8" in brass or aluminum



SCRUGUN*
Drives machine screws and nuts up to ¼" diam., self-tapping screws up to #12, wood screws up to #10 x 2"

Yes, these timesaving Van Dorn "Power Triplets" have a lot in common! They're all powered by Van Dorn-built universal motors, "tailor-made" for the specific tool they drive. They're all perfectly balanced and matched in design, with the famous "Pistol Grip and Trigger Switch," for easier handling. They're all packed with the strength and stamina that Van Dorn builds into every tool. They're all *engineered* to turn out more uniform work at lower cost. No wonder production men everywhere rate them *tops* for thousands of assembly operations!

And there are *other* Van Dorn Portable Electric Tools that cut *other* production costs as follows: Sanders for abrasive finishing, grinding, wire brushing and buffing; Quick-Saws for cutting wood, metal, composition; Shears for sheet metal cutting; Hammers for driving star drills, chisels, bull points. See your nearby Van Dorn Distributor for full details. Write for free catalog to: The Van Dorn Electric Tool Co., 719 Joppa Rd., Towson 4, Maryland.

FOR POWER SPECIFY

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

*Trade Mark Reg. U. S. Pat. Off.

Tramrail HANDLING WHICH WILL HELP You?

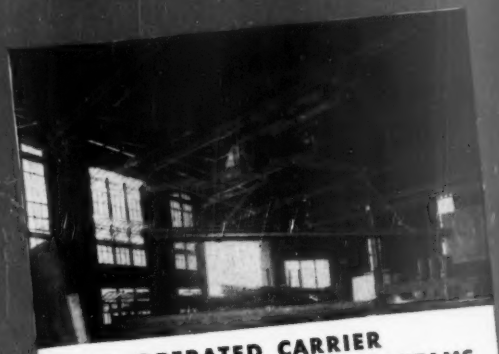
GANTRY CRANES SOLVE PRODUCTION PROBLEMS

Inexpensive single-leg gantry cranes are solving production problems in many plants. They usually work under heavy overhead cranes and take care of light local handling.

Several gantry cranes often can be obtained for the cost of a heavy overhead crane.

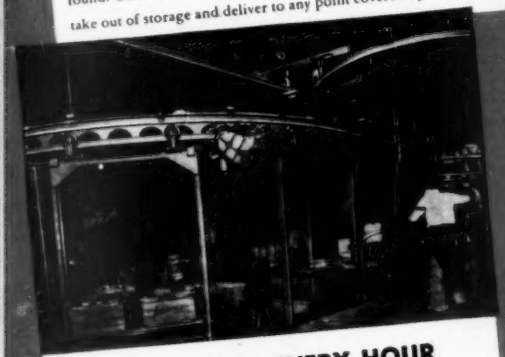
20 FOOT BARS
Stored and Handled Efficiently

Simple, inexpensive overhead tramrail cranes make it easy to handle long, unwieldy bars and store them in racks where readily found. One man can easily and quickly place a heavy bar into or take out of storage and deliver to any point covered by the crane.



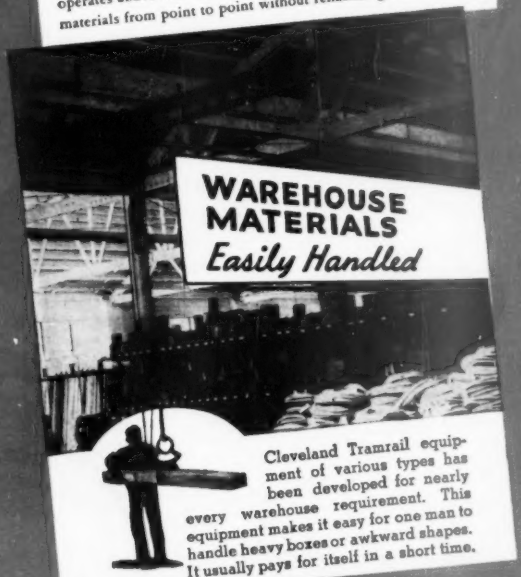
CAB-OPERATED CARRIER HANDLES LONG PIPE AND BEAMS

It is difficult to handle long pipe and beams through narrow shop aisles and around corners on floor conveyances. Cleveland Tramrail equipment makes this work fast and easy because it operates above floor obstacles and traffic. It hoists and delivers materials from point to point without rehandling.



675 MOLDS EVERY HOUR

Every hour 675 molds are carried to the pouring section and then through cooling and shakeout areas on this Cleveland Tramrail continuous foundry mold handling system. Because travel machinery is overhead, away from dirt and hot metal, production interruptions and maintenance are kept at minimum.



WAREHOUSE MATERIALS *Easily Handled*

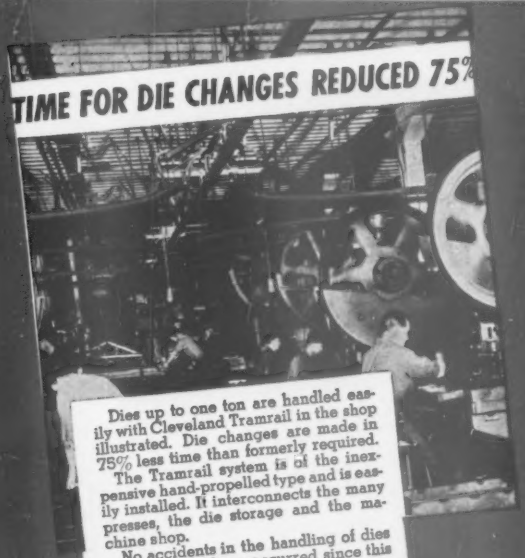
Cleveland Tramrail equipment of various types has been developed for nearly every warehouse requirement. This equipment makes it easy for one man to handle heavy boxes or awkward shapes. It usually pays for itself in a short time.

Ideas

SAVES $10,000 PER YEAR

This great saving was made with a Cleveland Tramrail cab-operated crane and motor-driven paper roll grab, because of better handling efficiency and elimination of damage losses due to crushed edges, cuts and tears.

TIME FOR DIE CHANGES REDUCED 75%



Dies up to one ton are handled easily with Cleveland Tramrail in the shop illustrated. Die changes are made in 75% less time than formerly required.

The Tramrail system is of the inexpensive hand-propelled type and is easily installed. It interconnects the many presses, the die storage and the machine shop.

No accidents in the handling of dies and materials have occurred since this system was installed 4 years ago.

STORING AND HANDLING 1728 REELS

The three racks shown above are 63 feet long and will accomodate 576 reels per row or a total of 1728 reels. This number of 24" reels will store 300,000 pounds of wire.

The reels are taken to or removed from the racks by means of a Cleveland Tramrail overhead rail system with easily operated chain hoists and special reel grabs. Each reel space is numbered and each reel is weighed before placing on racks, which makes keeping a perpetual inventory easy.

WEIGH MATERIALS ON TRACK

ACCURATE — EFFICIENT — NO REHANDLING

Rolls, or loads of any materials, conveyed on a Cleveland Tramrail overhead system, are quickly and accurately weighed without handling by running the carrier onto a track section which is connected to a floor scale.

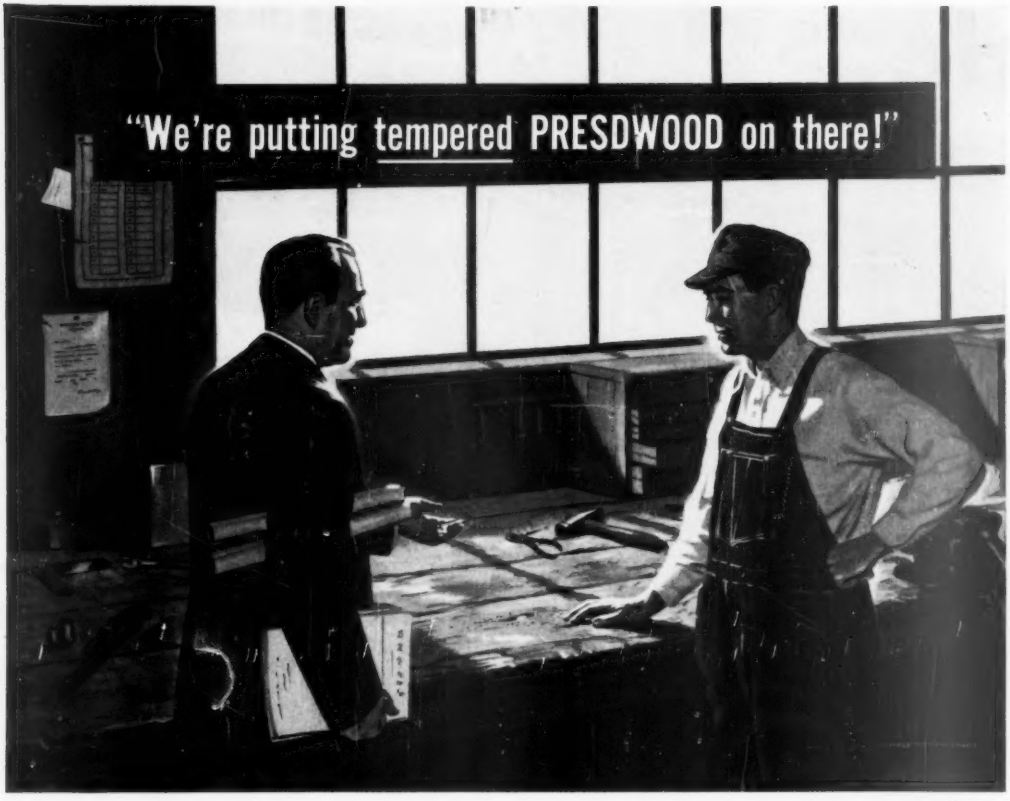
GET THIS BOOK!

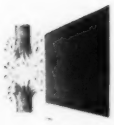
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3241 East 284th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT





Cut maintenance costs . . . speed production

Plant men know how scarred or corroded work surfaces can slow production and retard over-all efficiency. That's why so many resurface with time-proved Masonite Tempered Presdwood. It holds down maintenance costs, boosts production.

This marvelous hardboard is not just ordinary wood. It's made from exploded wood into hard, dense, tremendously strong panels with dozens of profitable applications around your plant—work surfaces, walls, partitions, stock bins, chutes, hand trucks and many more.

Grainless and uniformly smooth, Tempered Presdwood resists moisture permanently. It won't crack, split, dent or corrode. Glareless in its natural brown state, it readily takes virtually any finish.

Tempered Presdwood is quickly and easily applied, without special tools, in new construction or right over old scarred surfaces. Available at lumber dealers' in several panel sizes. Masonite Corporation, Chicago 2, Ill.

SEND FOR SAMPLE!

MASONITE CORPORATION
Dept. FM-1, 111 W. Washington St.
Chicago 2, Illinois

Please send me, without cost or obligation, a sample of Tempered Presdwood.

Name _____

Business Address _____

_____

MASONITE REG. U. S. PAT. OFF.
PRESDWOOD *the best wood*

"Masonite" and "Presdwood" are registered trade-marks. "Masonite" signifies that Masonite Corporation is the source of the product.

NOW

for the First Time . . .

A SIT DOWN RIDING TYPE STACKER

It's the Transrider!

Everyone knows the famous Automatic TRANSTACKER . . . the high lift stacker that moves, lifts and stacks material with "touch of your thumb" ease.

Now, for the first time, you get all the benefits of this miracle truck, but with the added advantage that you now can RIDE it. Operator sits comfortably on the TRANSRIDER . . . does your material handling with utter ease, lifting, tilting and driving simultaneously.

Its batteries are interchangeable with the Transporter Motorized Hand Truck Series, and no new charging equipment is necessary.

With a telescopic lift mechanism, the Transrider raises load to 130 inches, with an overall height of only 83 inches for clearance through standard boxcar and factory doors. Single lift, before telescopic uprights are extended, is 66 inches.

The shortest of any truck of like capacity, Transrider is maneuverable in cramped working quarters. Carrying a 36-inch load, it can right-angle stack in nine-foot aisles. This means added storage space within present building capacities. Truck capacities range from 2000 pounds for 48-inch long load to 3000 pounds for a 28-inch load.

At Transrider's new, low cost, every business now can use modern, money-saving material handling methods! Mail coupon for complete facts.

NOTHING LIKE IT FOR LOW COST MATERIAL HANDLING

Tilting Type TRANSTACKER

This is the famous Transtacker you walk with . . . and now made even more efficient with new tilting uprights that cradle the load for easier, faster spotting of loads, and maximum protection for both operator and merchandise.

High pressure hydraulic single or telescopic lift stacks your product to new heights, to increase storage capacity. Finger-tip control lifts a 36-inch, 2500-pound load, or a 48-inch, 2000-pound load in a matter of seconds. Transtacker also operates on standard batteries, and chargers, interchangeable with the Automatic Transporter. Mail coupon.

Transrider Stacker

A PRODUCT OF AUTOMATIC

Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY

DIV. OF THE YALE & TOWNE MFG. CO.

39 West 87th Street, Dept. A-9, Chicago 20, Ill.

Please send me catalog and complete facts on the new, low-priced

☐ TRANSRIDER

☐ TILTING TYPE TRANSTACKER

Company Name.....

By.....Position.....

Street Address.....

City.....Zone.....State.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

THE *Cost Reduction* SHOW

For cost-conscious, improvement minded executives! See at first hand the new machines and methods that are working daily miracles of cost reduction in factories, warehouses, stores. Over 200 leading manufacturers will present the latest materials handling developments—in one place, at one time—for you to inspect, compare, buy!

3rd National MATERIALS HANDLING EXPOSITION

Hear the country's top authorities describe newest refinements in materials handling equipment and techniques at technical sessions concurrent with the show.

For hotel accommodations, write Housing Bureau, 17th & Sansom Streets, Philadelphia 3.

CONVENTION HALL · PHILADELPHIA

★ JANUARY 10-14 · 1949 ★

EXPOSITION MANAGEMENT • CLAPP & POLIAK, INC. • NEW YORK CITY

WHAT'S *YOUR* PLANT'S

EYE-Q ?

In the magnificent new Memphis, Tennessee, plant of the Willard Storage Battery Company, Truscon Eye-Comfort Color Harmony combinations have been used throughout in the interests of eyesight energy conservation, and to scientifically supplement natural and artificial illumination.

A section of the factory area finished in the Truscon COOL LIGHT series is shown above, at right, and below is an exterior view of this handsome, modern plant.

Everywhere today top management and maintenance specialists are concerning themselves with the proved advantages thus to be gained in better employee morale and stepped-up worker efficiency.

A High "Eye-Q" is the Cue to High Production

Compare your own visual reactions to the hard, contrasty, black, white and gray photograph at the left, above, with your response to the pleasantly colorful Eye-Comfort Color Harmony treatment at the right. This is a fair object-lesson in the eye comfort difference between old-time standard mill-white procedure and today's scientific approach to coloration as it affects people and production.

Truscon studies and the research of many other institutions and individuals in color factors as they relate to eyesight and eye fatigue have resulted in the formulation by Truscon of a simple, easily understood and easily applied system of harmonious colors. There are four series in the system plus several necessary accent colors for safety, identity and convenience.

Wherever human beings gather to work or study or play, these eyesight factors are important to building owners. Truscon specialists in these subjects are available at no charge to survey your plant and will make recommendations without obligating you. Also, there's a fine, new booklet on Eye-Comfort just off the press and you are welcome to a copy—no charge, of course. Write or wire Dept. EC-8, *Truscon Laboratories, Division of Devoe & Raynolds Company, Inc., Detroit 11, Michigan.*

Eye-Comfort

COLOR HARMONY

DAY LIGHT • COOL LIGHT

WARM LIGHT • SOFT LIGHT

TRUSCON *laboratories*

Reg. U.S. Pat. Off.

Let the wonderful June weather of Colorado remind you of the fresh, invigorating atmosphere that can be enjoyed in any business or building by installing American Blower Equipment for heating, cooling, ventilating, air conditioning or air handling.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICH. • CANADIAN SIROCCO CO., LTD., WINDSOR, ONT.

AMERICAN BLOWER

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

VENDING MACHINES EARN MORE ...both in production and "on location"

. . . when machine-builders "buy the idea" of AMERICAN PHILLIPS SCREWS

PRODUCTION "PAYOFFS" climb up toward jackpot levels, where American Phillips Screws are policing costs in all assembly departments. Workers work faster and better. Shiny surfaces are never gouged. For American Phillips Screws and drivers are fumble-proof, skid-proof, slash-proof. And they can be handled *by anyone* with such ease and speed that time-savings average *50% over slotted screws.*

STEADY "PLAYS" are sure to be attracted by smartly styled machines, assembled with modern, attractive American Phillips Screws . . . the screws with the universal crossed recess. No burred heads to snag clothes. No loosening of screws under vibration and incessant use. And no matter what *you* make or vend, chances are you can profit *doubly,* too, through the production savings and merchandising power of American Phillips Screws. Write.

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN SCREW COMPANY, PROVIDENCE 1, R. I.

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES

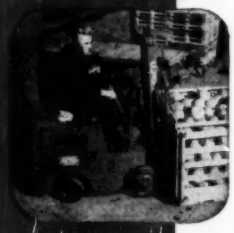
ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

CHAMPIONS!...IN ALL CLASSES

Bantam: Trucloader

For fast action, unbeatable stamina and the versatility to handle any assignment in the busiest 1000-pound class, this hard-hitting little machine drops handling costs "for the count." Use it in factory, foundry and mill—in warehouse, stockroom and shipping dock.

Gas-powered and electric battery-powered models; solid or pneumatic tires



Lightweight: Clipper

This rugged unit takes on any load-opponent in the 1000, 1500, and 2000-pound classes—and has an extraordinary knock-out record against handling costs. You'll find Clippers busily at work in every branch of industry in which materials are handled.

Gas-powered and electric battery-powered models

Middleweight: Carloader

By Industry's own enthusiastic acknowledgment, here's the Champion of Champions. *More Carloader trucks are on the job everywhere, every day, than any other fork-lift truck model ever built.* It's an astonishing combination of speed, maneuverability and rugged strength.

Gas-powered—
3000, 4000, 5000-lb. capacities
Electric-battery-powered—
4000, 5000-lb. capacities

Heavyweight: Utilitruc

For heavy assignments the Utilitruc wears the crown. This big fellow makes light work of lifting, moving and tiering loads weighing 6000 and 7000 pounds—and gives costs a sound beating. In metal industries, building-materials yards, warehouse and docks, shrewd buyers choose Utilitrucs.

Gas-powered and electric battery-powered

Outdoor Ace: Yardlift

In the Yardlift models, Clark provides strength, efficiency and durability on pneumatic tires. For handling operations that include outdoor storage and passage over rough surfaces, inside or out, the Yardlifts handle their loads swiftly, steadily, safely.

Yardlift 20 — 2000-pound capacity
Yardlift 40 — 4000-pound capacity
Yardlift 60 — 6000-pound capacity

CLARK

Gas-Powered
FORK TRUCKS
1000 - 7000 lbs. Capacity

Electric Battery-Powered
FORK TRUCKS
1000-7000 lbs. Capacity

Gas-Powered
TOWING TRACTORS
30-104 Tons on Trailers

Gas-Powered
TRUCTRACTORS
"Tip", "Dump" & "Shovel" Models

A Full Line of
HANDLING ATTACHMENTS
Crane, Ram, Scoop, Revolving Head,
Paper Scoop, Barrel and Drum Carriers
and others ... including:
UNIVERSAL CLAMP ... BARREL UP-ENDER
PUL-PAC ... CLAMP-LIFT ... HI-LO-STACK

INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT COMPANY
BATTLE CREEK 12, MICHIGAN

NOW...
DRIVE PROVED
MADE WITH RAYTEX FORTIFIED RAYON
Strong, continuous filament rayon specially processed to eliminate stretch...Impregnated with live rubber for high flex strength and long life.
MINIMUM STRETCH • GREATER FLEX STRENGTH • LONGER V-BELT LIFE

Only Dayton V-Belts are DRIVE PROVED for the Job

HEAVY-DUTY DRIVES

The Dayton Thorobred, standard of industry. Bends without straining or heating. Always runs true, flexes freely around the pulley without squashing. Equally efficient on V-Flat drives. Matched in sets for multiple drives.

LIGHT-DUTY DRIVES

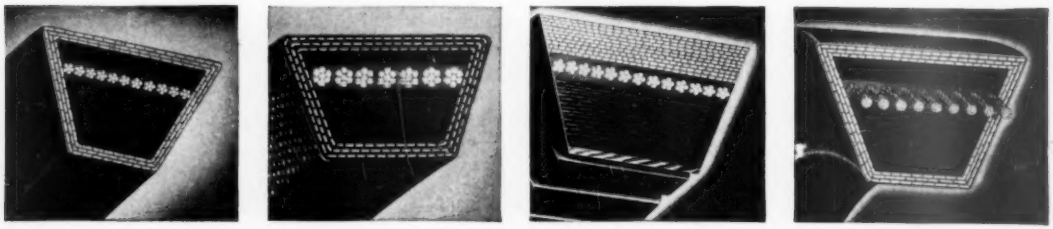
The Dayton FHP V-Belt, for fractional horsepower motors on small machines and appliances. Especially designed for quiet, vibrationless performance. Exceptionally strong. Will not twist, squash, or stretch.

SMALLER PULLEY DIAMETERS

The Dayton Cog-Belt, the most flexible V-Belt made. Permits use of 25% smaller pulley diameters and shortest centers for greater saving of space. The built-in Cogs eliminate bumping, jarring or inching.

HIGH-SPEED DRIVES

Dayton Steel Cable V-Belts for extreme load conditions. Fine gauge, heat-treated steel strands, cabled for extra strength. Evenly spaced and absolutely parallel. Available in patented Cog, or, standard V design.



Dayton V-Belts

..as near as your telephone

A new V-Belt service by Dayton, to save you time and money three ways:

1. "Drive Proved" V-Belts

To give you the right belt... drive proved to your particular drive. For Dayton has made more than 100 million V-Belts. They have been drive proved in every kind of industry, under every possible operating condition of heat, cold, dirt, dust and oil. They have proved their ability to save space; to provide positive power; start and stop smoother; run quietly, without vibration and last longer than any ordinary belt.

2. As near as your telephone

There is a Dayton V-Belt Distributor near you. He is equipped with the specialized knowledge to recommend the right drive to serve you most efficiently. If it's an unusual application, he has the resources of the entire Dayton organization to call on. You'll find him listed in the classified section of your telephone directory or his representative is now calling at your plant.

3. Instant maintenance service

Your Dayton Distributor maintains complete stocks of Dayton "Drive Proved" V-Belts and Pulleys. He is prepared to give you instant service for existing or future drives, and to provide you with an immediate source of mill supplies.

Put this new service to work in your plant now. Equip your drives with Dayton "Drive Proved" V-Belts and be sure you are getting the maximum in drive performance and service. Call your Dayton V-Belt Distributor today. *The Dayton Rubber Company, Dayton, Ohio.*

IT'S EASY TO BUY DRIVE PROVED **DAYTON V-BELTS**

Look in the yellow pages of your telephone directory under Belting. You'll find your distributor listed under Dayton V-Belts.

Phone him. He has the specialized knowledge to recommend the right *"Drive Proved"* Dayton V-Belt for your particular drive.

He maintains complete stocks of Dayton V-Belts and Pulleys for your needs. Assures you that your drives will always perform with top efficiency.

Dayton Rubber

THE MARK OF TECHNICAL EXCELLENCE IN NATURAL AND SYNTHETIC RUBBER

Test your Brush I.Q.

No. 1 in a Series

What river produced the first paint brush?

The first paint brushes were made from reeds which grew profusely along the banks of the Nile. Early Egyptians cut and shredded these reed ends into fibers. Similar brushes were made from the stems of palm leaves. Remains of such brushes are still to be seen in the British Museum.

In PITTSBURGH BRUSHES you have the ultimate in brush-making skill . . . and in Pittsburgh you have a name on which you can depend!

PITTSBURGH—
Produces the Most Complete Brush Line in the Industry!

Painting . . . Pittsburgh's famous line of Gold Stripe bristle brushes, Neoceta and Nylon brushes represents a reliable source of the finest paint brushes you can buy. The Neoceta brush especially, has been created to give you more economy in these days of rising costs.

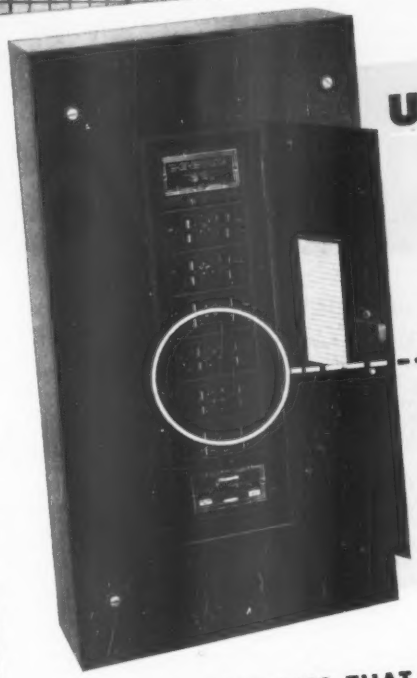
Maintenance . . . Pittsburgh's brush-making know-how has been applied to the "Lightning Line" of sweeps and scrubs. These demon workers dig in with a vengeance! They work harder, longer! There's a conveniently located Pittsburgh Plate Glass Company branch near you.

One Source—One Quality—One Name to Remember—PITTSBURGH!

BRUSHES FOR INDUSTRY

BRUSHES · PAINT · GLASS · CHEMICALS · PLASTICS

PITTSBURGH PLATE GLASS COMPANY



USE THIS *NEW* NMO "*PLUG-IN*" PANELBOARD

Wherever a large number of branch circuits for lights, appliances and business machines must be switched and protected.

1 SWING OUT...

2 OR LIFT OUT...

3 ATTACH WIRES...

4 "PLUG-IN"

HERE ARE FEATURES THAT REALLY COUNT:

✓ **Thermal-Coilless Magnetic**—Multi-breaker unit gives 2-way circuit protection. Thermal element holds harmless momentary overloads but trips on continuous overcurrents before wire insulation is overheated. Magnetic element trips quickly on "shorts" to localize damage.

✓ **Simple to Add or Change Circuits**—Four circuit Multi-breaker units have "Plug-in" feature. Any combination of 15, 20, 30, 40, or 50 ampere circuits available "off-the-shelf." Dummy units can be inserted to anticipate future requirements.

✓ **Smaller Size**—Compact Multi-breaker unit permits more circuits and larger wiring gutters without increase in overall panel size. Better utilization of wall and column space.

✓ **Easy to Wire**—Multi-breaker units can be swung or lifted out to attach wires. Approved connector eliminates "looping."

Illustrated NMO Bulletin gives complete information on the new Panelboards. Address Square D Company, 6060 Rivard St., Detroit 11, Michigan.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

You need the right TOOLS to cut HIGH HANDLING COSTS

on production, assembly or packaging lines!

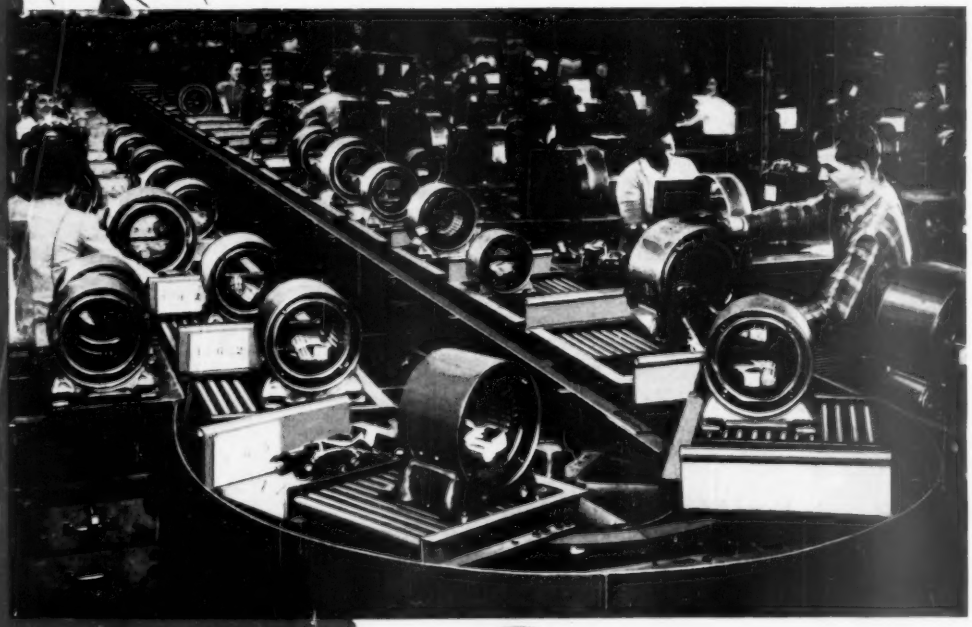
Yes — just as you need modern, high-production tools to increase the rate and reduce the cost of production, you need the best in modern conveyors to get results in cutting handling costs.

Finding out how to apply conveyors most effectively in your operations is equally as important to Standard as building them well. An experience record of more than 40 years is an important reason why we can be of real service to you.

Standard builds gravity and power conveyors — roller, belt, slat, push-bar, and chain — wheel conveyors — portable conveyor sections — portable powered conveyor units — plus spiral chutes and pneumatic tube systems. On any conveyor requirement — large or small — write to Standard or telephone nearest sales office.

STANDARD CONVEYOR COMPANY, NORTH ST. PAUL 9, MINN.

Sales and Service in Principal Cities



Standard

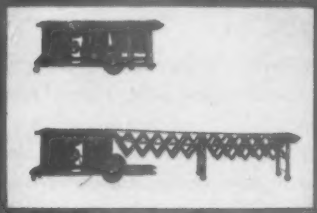
GRAVITY & POWER

CONVEYORS

Put Standard Portable Units to Work in
STORAGE AND WAREHOUSE AREAS

THE HANDIPILER

THE HANDIBELT



THE EXTENDOVEYOR

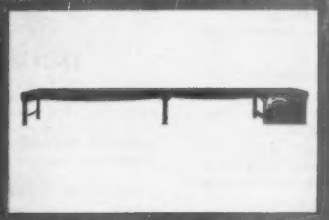
HANDIPILER — Portable, electric powered (110 V. — A.C.) self-contained, light weight, reversible belt conveyor unit. Use it for loading, unloading, elevating or stacking of all types of boxed, cartoned, bagged or case goods. Boom reaches far into cars, trucks, trailers, storage piles.

HANDIBELT — Portable all-purpose, self-contained, electric powered (110 V. — A.C.) reversible belt conveyor unit. Belt inclines or declines at adjustable heights. Handles all types cartons, cases, bags or boxes. Fits in crowded aisles, cars, trucks, elevators.

EXTENDOVEYOR—Unique, self-contained, portable, electric powered belt conveyor. Work it like an accordion — make it long or short — slope it up or down. Readily moves about in confined areas. Reversible. Maximum length 46 feet.

"Mechanize" Handling in
RECEIVING AND SHIPPING DEPARTMENTS

THE INCLINE BELT



THE LEVEL BELT

THE HANDI-DRIVE

INCLINEBELT — Reversible belt powered unit for between-floor handling of boxes, bags, cases or cartons. Ideal for multi-floor warehousing or shipping and receiving areas. Two belt widths available — 14 inch and 24 inch.

LEVELBELT—Self-contained, electric powered, belt conveyor. Handles boxes, bags, cartons, cases. Available from 21 to 161 ft. long in 28, 32 and 36 inch heights and 14 and 24 inch widths. Speed — 60 ft. per minute — either direction.

HANDI-DRIVE — New "packaged" conversion unit to power any gravity belt or roller conveyor. Quickly and simply converts any existing belt or roller conveyor to power driven live belt or roller. Design your own system with Handi-Drive.

{use this coupon to get complete information}

STANDARD CONVEYOR COMPANY
Dept. FM-19, North St. Paul 9, Minn.

Send literature on equipment checked.

- ☐ Handibelt
- ☐ Levelbelt
- ☐ Handipiler
- ☐ Handidrive
- ☐ Handi-Drive
- ☐ Extendoveyor
- ☐ Inclinebelt
- ☐ General Catalog — Gravity and Power Conveyors
- ☐ General Catalog — Standard, Portable and Power Units

Name and Title: .....

Company: .....

Street Address: .....

City: ..... Zone ..... State .....

Standard
GRAVITY & POWER
CONVEYORS

SUN "JOB PROVED" PRODUCTS CUT COSTS,

Sun products have been "Job Proved" in the lubrication of almost every type of mining, manufacturing, power, and transportation equipment . . . in refrigeration and air-conditioning . . . in metal cutting, tempering, and quenching . . . in the processing of textile fibers, leather, natural and synthetic rubbers . . . in the impregnation of electrical, electronic, and packaging materials of many kinds.

To help you solve your production problems, Sun Oil Company offers a wide selection of "Job Proved" petroleum products, plus the experience of Sun Engineers. Their know-how and detailed product information are yours for the asking. Call your local Sun office, or write Dept. F-1.

SUN OIL COMPANY • PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

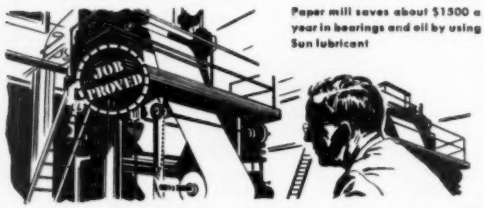
INDUSTRIAL OILS

SUNVIS 900 OILS—High-viscosity-index, paraffinic-type oils—of uniform O F pour point—fortified against rust, corrosion, oxidation, and sludge. The finest available lubricant for turbines, hydraulic systems, and similar applications.

SUNVIS HD 700 OILS—High-viscosity-index oils containing additives which minimize oxidation and give detergency. Ideal lubricants for internal combustion engines subjected to continuous heavy loads under the most adverse conditions.

SUNVIS OILS—Solvent-refined paraffinic-type oils of uniform high viscosity index, low pour point, and low carbon content. Especially suitable for application to long-time use in all types of industrial reservoirs and circulating systems.

DYNAVIS OILS—Low-pour-point, high-viscosity-index, inhibited oils, containing an additive which helps prevent formation of harmful corrosive and sludge-forming acids. Well suited for engines fitted with alloy bearings and operated at high temperatures.



Paper mill saves about $1500 a year in bearings and oil by using Sun lubricant

SOLNUS OILS—Well-refined straight mineral oils. Stand up under hard use for long periods of time. Recommended for use in machine tools, air compressors, certain types of diesels, etc.

CIRCO OILS—Used for general lubrication of industrial machinery when straight mineral oils are required.

SUNTAC OILS—100%-petroleum products which have been compounded to increase their adhesiveness. Recommended for general lubrication of all machines subjected to sudden shocks and load reversals. Cling to the parts to be lubricated.

STEAM CYLINDER OILS—High flash and fire point lubricants for either saturated or superheated steam conditions and for worm-gear speed-reduction units.

SUN CAR JOURNAL OILS—Dark oils meeting A.A.R. Specifications. For use in waste-packed bearings of railroad equipment.

SUN DELAWARE OILS—Dark oils for general lubrication on older types of industrial machinery.

SUNOCO WAY LUBRICANT—For use on tableways. Eliminates chatter and scoring . . . resists corrosion. Has good metal-wetting and adhesive properties, ample viscosity, and E. P. qualities.

SUN MARINE ENGINE OILS—Compounded with special emulsifying agents in order to provide adhesion to, and lubrication of, working parts in the presence of water. For the lubrication of bearings, eccentrics, crossheads, and various other parts of steam engines.

ROCK DRILL OIL—High-film-strength adhesive oil. For use in jackhammers, stopers, drifters, and similar equipment.

INDUSTRIAL GREASES

SUN CUP GREASES—Water resistant. For grease-cup and grease-gun application when service is normal.

SUN GUN GREASES—Smooth greases made with medium-viscosity oil. Stable under pressure in power and booster guns.

ADHESIVE PRESSURE GREASES—Won't drip or splash. Excellent lubricants for open-gear applications.

SUN DARK PRESSURE-SYSTEM GREASES—For power-driven central grease lubricating systems in heavy industries. Also used as a "medium cup grease."

SUN MINE CAR GREASES—Available in several grades. Suitable for both antifriction bearings and plain-bearing cavity-type wheels.

SUN MINING MACHINE LUBRICANT—Semifluid. For use where a light but adhesive grease is required. Resists separation and decomposition.

Chemical plant saves about $8000 per year by adopting Sun Pressure Grease

SUN ROLLER BEARING GREASES—For use on electric motors and generators and high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS—Black adhesive open-gear compounds and

"JOB PROVED" IN EVERY INDUSTRY

SUN PETROLEUM

SPEED PRODUCTION, IMPROVE QUALITY

wire-cable greases. Recommended for power presses, mining machinery, worn reduction mills, crushers, pump gears, etc.

SUNOCO TRACTOR ROLLER COMPOUND—For crawler-type tractors. Provides good lubrication with exceptional sealing qualities.

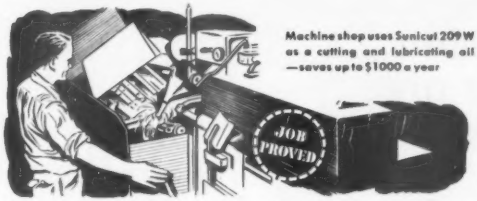
METALWORKING OILS

SUNICUT—Straight (non-emulsifiable) transparent cutting oils. Recommended for automatic screw machines and heavy-duty machining operations. Permit high speed production with excellent finishes, long tool life.

SUNOCO EMULSIFYING CUTTING OIL—A self-emulsifying oil which produces a stable white emulsion. Efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and nonferrous metals. It is also an excellent grinding coolant.

SUN QUENCHING OILS—Specially refined oils designed to aid development of maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel. Because of their low carbon content and stability under heat, these oils have an unusually long service life.



Machine shop uses Sunicut 209 W as a cutting and lubricating oil —saves up to $1000 a year

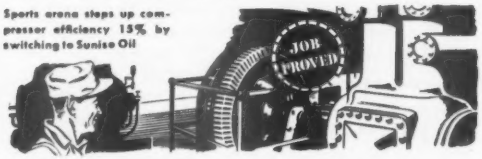
SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum, brass, and copper.

SUN ANTI-RUST COMPOUNDS—Petroleum-base oils with chemical additives designed to prevent the rusting and corrosion of steel.

REFRIGERATION OILS

SUNISO REFRIGERATION OILS—Have extremely low pour points, extremely low wax-separating characteristics, a high degree of stability and long life. Initially neutral and resistant to formation of detrimental acids under service conditions. Suniso Oils are high quality oils suitable for both high- and low-temperature operations. The most widely used oils in refrigeration and air-conditioning.

Sports arena steps up compressor efficiency 15% by switching to Suniso Oil



TEXTILE-PROCESSING OILS

SUNOTEX TEXTILE OILS—Designed to impart certain additional properties to various forms of fibers during their processing from the fiber state into a manufactured product. All Sunotex textile oils are emulsifiable in water. Highest rating in fadometer tests.

SUN COTTON CONDITIONING OILS—Pale mineral oils which condition the cotton. They prevent waste by cutting down excessive amounts of "fly" (fine air-borne lint particles).

Worsted mill obtains easier scouring, better quality, larger yield with Sunotex WO-220

SUN ASBESTOS FIBER CONDITIONING OIL—Used for spraying on the asbestos during processing. Fibers are kept from being damaged or broken down, and harmful dust is minimized when this product is used.

SUN CORDAGE OILS—Generally used alone, but are adaptable to various formulas used by cordage manufacturers. Selected products, highly compatible with additives.

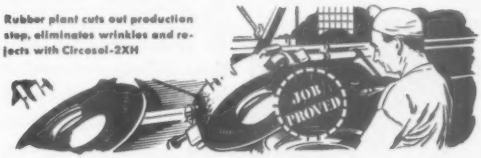
RUBBER-PROCESSING AIDS

CIRCOSOL-2XH—An elasticator and processing aid for natural rubber and especially for GR-S. Outstanding for sponge rubber.

CIRCO LIGHT PROCESS AID—A processing agent and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber. Used for GR-S to some extent.

SUNDEX-54—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established processing aid for rubber footwear stocks and semihard rubbers.

Rubber plant cuts out production step, eliminates wrinkles and rejects with Circosol-2XH



CIRCOMAR-5AA—A black-colored product for processing natural and GR-S rubber used in tire-making. Also used in reclaiming natural-rubber scrap. Replaces asphalt fluxes. Free-flowing at room temperature.

WAXES

Sun's new wax plant will be completed in 1949. Its many refining innovations and extreme flexibility will permit new types of waxes to be manufactured in large quantities—a procedure heretofore impracticable. A wide range of fully refined paraffin and microcrystalline waxes will be "tailor-made" to meet the requirements of virtually all major industrial applications. Pilot plant samples of several grades are now available.

MISCELLANEOUS INDUSTRIAL PRODUCTS

SUN SOLVENTS—Sun Spirits for the thinning of paints, varnishes, and enamels, and for metal-cleaning . . . a pure, water-white petroleum solvent free of corrosive sulphur. Other Sun solvents with special properties are available for the chemical industry.

SUN LEATHER OILS—Mineral-base leather oils. Used for obtaining the desired tensile strength, proper temper, and controlled moisture content. Maintain a light even color . . . mix well . . . distribute evenly.

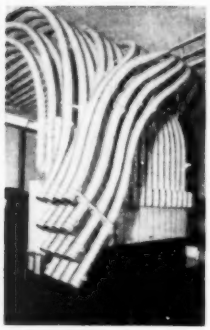
"JOB PROVED" IN EVERY INDUSTRY

PRODUCTS SUNOCO

GROVER

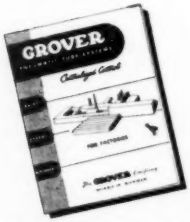
PNEUMATIC TUBE SYSTEMS Save Time and Money In Many Modern Plants

NINE MILE LONG GROVER SYSTEM IN NEW MEMPHIS FIRESTONE PLANT TYPIFIES PNEUMATIC TUBE VALUE IN INDUSTRY



This is the pattern of the Memphis Firestone Plant's central station in the GROVER System which handles around 6000 rubber samples daily.

At four stages in the processing of automobile tires, laboratory analysis is required. Of course, it's impossible, for economic and physiochemical reasons, to have a quiet, clean laboratory at every aisle corner in a plant. The solution in the vast new Memphis plant of Firestone was a GROVER Pneumatic Tube System with handy stations to whisk the materials safely and quickly between point-of-sampling and testing laboratory. Wherever manufacturing process control calls for such testing routine, the elements of speed, dependability and protection from contamination point up the wisdom of using the GROVER method. It meets modern needs. Any GROVER representative will gladly discuss *your* special problems. There's no obligation. Our new Factory Bulletin is yours for the asking.



GROVER has a special Factory Bulletin of interest to plant traffic and production personnel. Write *Grover Company, 25519 W. Eight Mile Road, Detroit 19, Michigan.*

GROVER

PNEUMATIC TUBE SYSTEMS LITERALLY GIVE WINGS TO PAPER WORK, MONEY, SMALL PARTS, SAMPLES

Man or boy messenger service is not adequate to fit in with the tempo of present day industrial production. Uncertainty, human error, slowness—these factors can all be ruled out by planning on GROVER equipment to do the messenger job quickly, tirelessly, without error.

ELIMINATES ERRORS, DELAYS, HIGH COST OF MESSENGER SERVICE

Central control by trained personnel is a major factor in the stepped-up plant efficiency secured with a GROVER installation. Quietly and speedily inter-departmental communication and transmittal go on. In chemical sampling analysis, in production line delivery of small parts, in all paper work transmission, there's a degree of efficiency achieved that management needs.

GROVER

• PNEUMATIC TUBE SYSTEMS •

THE GROVER COMPANY • DETROIT 19, MICHIGAN

Offices in Principal Cities

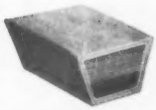
Fills Every Need for V-Belt Drives!

***TEXDRIVE* SHEAVES**
Cast Iron with 1 to 6 grooves for A and B belts. 1 to 25 h. p. *All sizes from stock.*

VARI-PITCH WIDE RANGE SHEAVES
Speed range up to 100%. 1 to 4 grooves, Q and R belts, fractional to 30 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*

***TEXSTEEL* SHEAVES**
Welded pressed steel with rolled edges. 1 to 6 grooves, A or B belts, ¼ to 25 horsepower. *All sizes from stock.*

STANDARD CAST IRON SHEAVES
Made to order from stock patterns. 1 to 14 grooves, A, B, C, D, or E belts, 1 to 1000 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*



***TEXROPE* SUPER-7 V-BELTS**
Wide range of types, sizes and sections to suit all operating conditions. *All standard sizes from stock.*

***MAGIC-GRIP* SHEAVES**
Semi-steel with patented taper bushing. On and off in a jiffy. 2 to 12 grooves, B, C, or D belts, 2 to 250 horsepower. *All sizes from stock.*

SPECIAL CAST IRON AND STEEL SHEAVES
Any number of grooves for A, B, C, D, or E belts. Up to 6000 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*

***TEX-IRON* SHEAVES**
Light weight single groove sheave for fractional horsepower applications. *All sizes from stock.*

***VARI-PITCH* STANDARD SHEAVES**
Speed range 9% to 28%. 2 to 10 grooves, A, B, C, D, or E belts, 1 to 300 horsepower. Stationary or Motion Control. Delivery good. *Call your nearest District Office or Texrope dealer.*

***VARI-PITCH* SPEED CHANGERS**
Speed range to 375%. 1½ to 75 horsepower. Single handwheel controls speed. Delivery good. *Call your nearest District Office or Texrope dealer.*

Best Delivery in the Industry!

NOW *YOU CAN GET* nearly every standard V-belt drive component from Texrope stocks. Even on non-stock items, Texrope delivery is the best in the industry. And Texrope is the *only* brand that meets *every* V-belt need.

Selecting a drive is as easy as looking up a telephone number in the 144 page Texrope Pre-Engineered Drive book. Covers 90% of all V-belt drives. Write today for Bulletin 20 B 6956 or see your nearest Allis-Chalmers Authorized Dealer or District Office. Also listed in Sweet's.

ALLIS-CHALMERS, 1078A SO. 70 ST. A 2546
MILWAUKEE, WIS.

Texrope, Super-7, Vari-Pitch, Magic-Grip, Tex-Iron, Tex-steel and Texdrive are Allis-Chalmers Trademarks.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

ALLIS-CHALMERS

Originators of the Multiple V-belt Drive for Industry

"We Had Approximately 300 Motors 'Single Phase' At One Time—But Didn't Lose a Single One" . . . .

"About three months ago a primary fuse on the pole blew and threw our entire plant on single phase. At the time our plant was running full force, which meant there were approximately 300 motors running.

"Most of the motors were protected with relays or thermals, backed up by Fusetron fuses. The rest were protected by Fusetron fuses alone.

"As quickly as we realized the single phase condition existed, the main switch was pulled.

"By that time many Fusetron fuses had blown — but we didn't lose a single motor.

"Fusetron fuses more than paid for themselves that day even though we had but a short time previously gone to the expense of making a complete installation throughout the entire plant."

. . . Chief Electrician,
Twin Coach Co., Kent, Ohio

. . . "Thanks to . . . .

Facts About FUSETRON Dual-Element FUSES

The fuse link element opens on short-circuit — the thermal cutout element protects on overloads — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters' Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to the same dimensions as ordinary fuses — fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.

Fusetron DUAL-ELEMENT Fuses

with their

10 Point Protection

1. Protect against short-circuits.
2. Protect against needless blows caused by harmless overloads.
3. Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.
4. Provide thermal protection — for panels and switches against damage from heating due to poor contact.
5. Protect motors against burnout from overloading.
6. Protect motors against burnout due to single phasing.
7. Give DOUBLE burnout protection to large motors — without extra cost.
8. Make protection of small motors simple and inexpensive.
9. Protect against waste of space and money — permit use of proper size switches and panels.
10. Protect coils, transformers and solenoids against burnout.

Get All the Facts - Send the Coupon Now!

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

FUSETRON Dual-Element Fuses Give ALL-PURPOSE PROTECTION

One needless shutdown — or one lost motor — or one destroyed switch or panel — may cost you far more than replacing every ordinary fuse with a FUSETRON dual-element fuse.

Don't risk such losses — protect yourself by installing a FUSETRON dual-element fuse in every set of fuse clips throughout the entire electrical system.

Bussmann Mfg. Co., University at Jefferson
St. Louis 7, Mo. (Division McGraw Electric Co.)

Please send me complete facts about Fusetron Dual-Element Fuses.

*Name*_____

*Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____ 149

Industrial Eye Accident Costs UP 78½%*

*SINCE 1939

When you buy a machine or tool today, you may pay *more* but you expect and you get *something* for your money. Not so with industrial eye accidents . . . they represent a TOTAL LOSS. In some industries, this loss can reach staggering proportions in terms of claims, medical aid, lowered employee morale, equipment mishandled by substitute workers and other visible and HIDDEN costs! Even if *your* plant may *appear* to have no eye accident problem, it will pay you to investigate what an adequate eye protection program can do for you and how reasonably it can be done. Ask your AO Safety Representative for the facts.

American Optical COMPANY *Safety Division*

Southbridge, Massachusetts • Offices in Principal Cities

50 YEARS OF PROGRESS WITH KESTER SOLDER

The present type of cored solder used by industry was first made by J. F. Kester in 1899. From the simple beginning of its first application . . . a few soldered connections in the old hand-crank telephone . . . it has continued to grow by keeping pace with new techniques as demanded by industry. Today's modern production would not be possible without cored solder.

Standard for Industry and Home Since 1899

RADIO-TELEVISION—The early commercial, amateur, and professional builders of radios accepted Kester Rosin-Core Solder as standard. Then as now, Kester still leads in this field.

AUTOMOTIVE—Ever since its inception Kester Acid-Core Solder has been and still is the standard in the automotive field and for the trade. Mechanics and repairmen insist upon it.

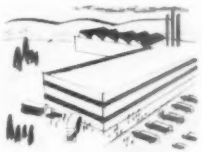
ELECTRICAL-ELECTRONIC—Kester makes a great variety of "specialized" core solders and solder preforms—even those suitable for the fine touch required in electronic work.

Over 100,000 Types and Sizes

of KESTER Flux-Cored SOLDER

AGRICULTURAL—For a half century Kester Cored Solder has been the farmer's standard for maintenance and repair. He uses Kester because his soldering must be fast and reliable.

HOMECRAFT—In hobbycraft as well as home repair, good solder bonds are essential. Kester Metal Mender and Radio Solder are the standards for all homecraft workers.



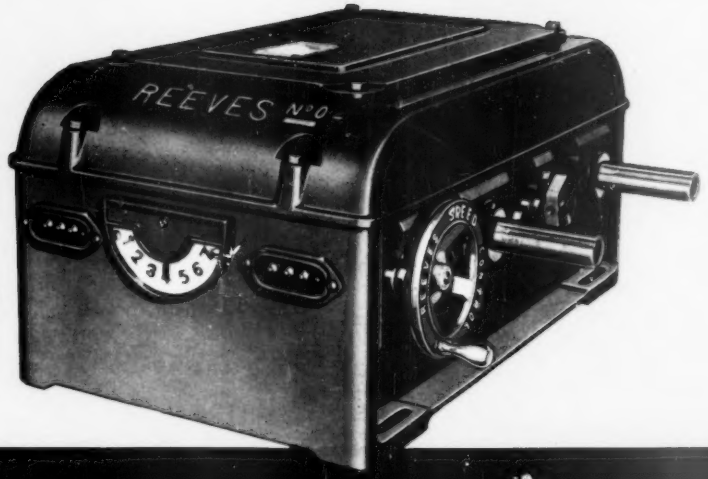
INDUSTRIAL—Kester Cored Solders have met every requirement for the past half century. They have earned the reputation for and are recognized as standard for industry.

Free—Technical Manual. Send for Kester's new 28-page manual, "Solder and Soldering Technique." A complete analysis of the application and properties of soft solder alloys and soldering fluxes.

1899 50th Anniversary 1949

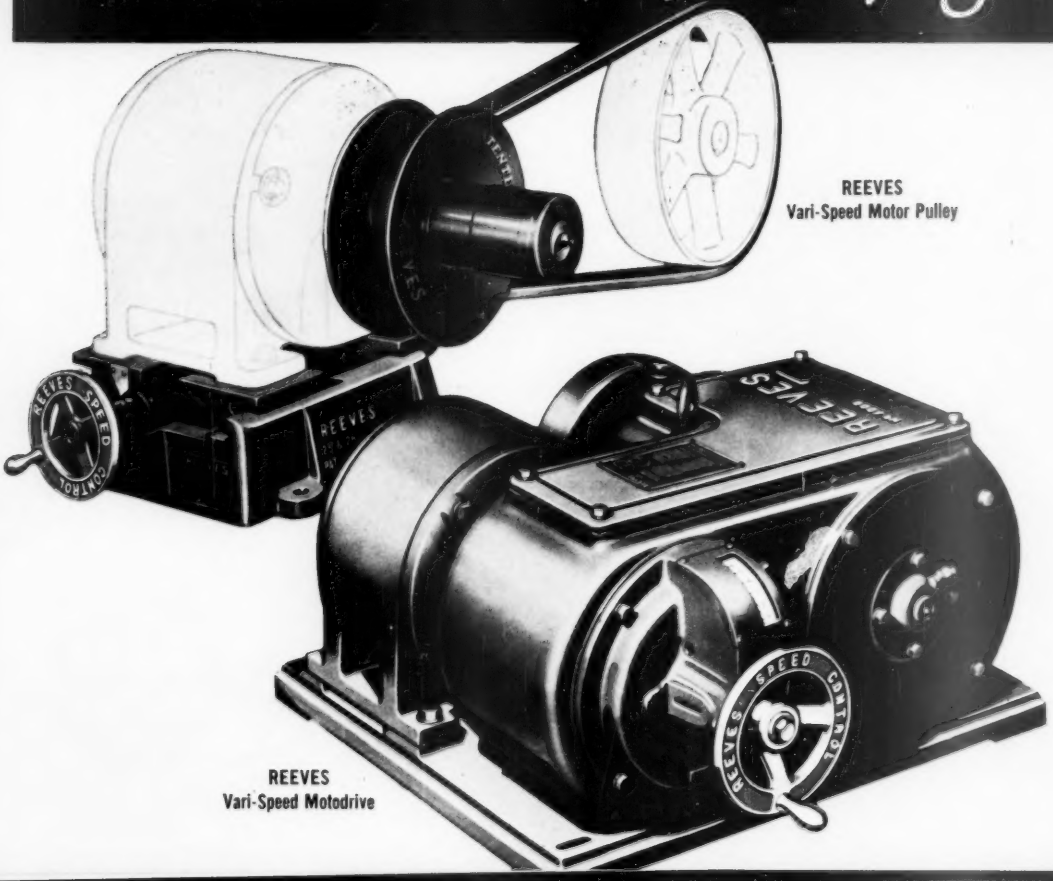
KESTER SOLDER

KESTER SOLDER COMPANY
4201 Wrightwood Avenue, Chicago 39, Illinois
FACTORIES ALSO AT NEWARK, NEW JERSEY • BRANTFORD, CANADA



REEVES
Variable Speed Transmission

Listen! to what they're* saying



REEVES
Vari-Speed Motor Pulley

REEVES
Vari-Speed Motodrive

By "They" we mean the 25,000 industries in which there are 265,000 successful REEVES installations . . . and the manufacturers of the 2,100 different makes of machines on which REEVES is standard equipment.

No two of these manufacturers have the same speed control problems. No two of them use REEVES in exactly the same way. Yet, *every one* of them agrees that REEVES cuts unit costs . . . increases production . . . improves quality of product!

Applied to your machines, REEVES Speed Control can give these same end results by performing one or more of these eight vital functions:

5 Maintain Uniform Peripheral Speed . . . maintain absolutely uniform tension on a decreasing or increasing diameter.

6 Compensate for Changes in Consistency of Materials . . . for changing density, coagulation, viscosity or congealing of material in process.

7 Match Variances in Number or Skills of Operators . . . provide the flexibility needed to speed up or slow down accurately and conveniently to meet changes in number of operators and to match the differences in skill of operators.

about Reeves Speed Control!

1 Assure Accurate Timing . . . provide maximum speed flexibility . . . insure exactness in heating, baking, drying, cooking, cooling or chilling time.

2 Compensate for Variable Weights, Pressures, Etc. . . . make possible, through automatic operation, instant speed changes to maintain uniform pressure weight, liquid level, temperature.

3 Widen the Work Range of Machines . . . permit handling of more shapes, sizes and materials on the *same* machine.

4 Regulate Conveyor Speeds . . . provide the desired speed without interrupting production flow . . . prevent delays, lost motion, congestion or idleness caused by over-supply at certain points and under-supply at others.

8 Synchronize Parts of One Machine or Machines Operating in a Series . . . permit a continuous flow of materials to run directly from one processing machine to another machine or from one section of a machine to another section . . . cut down material waste and insure higher quality, more uniform products.

REEVES maintains a nation-wide organization of experienced speed control engineers to aid in solving *your* speed control problems. The REEVES representative nearest your plant is always ready to counsel with you on your speed control needs—at no obligation. Write for his name, and for free, 114-page REEVES Catalog No. F19-450A.

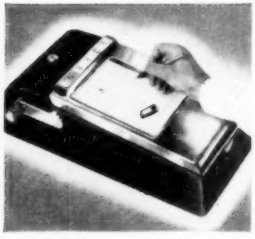
REEVES PULLEY COMPANY
Columbus, Indiana

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE · VARIABLE
Reeves Speed Control
GIVES THE RIGHT SPEED FOR EVERY JOB!

Why pay TWICE *for the same job?*

one writing is enough with UARCO *business forms*



for instance . . . *See the NEW UARCO REGISTER . . . for turning out simple records on the spot. Saves time and bother producing handwritten forms for every purpose. Forms are consecutively numbered to give you complete control. One copy is automatically filed, safe from tampering.*

You *do* pay twice when forms take twice the time they should . . . when the typists have to set carbons, line up copies. You pay twice when forms take twice the *effort* . . . when they have to be re-copied for each new use, or to correct needless errors.

Once does it with Uarco! Carbons are pre-set, copies pre-aligned —so there's no waste time in typing. And no waste *effort* thereafter —one writing makes every copy the job requires.

The result is dollars saved. In any kind of business—wholesaling, retailing, manufacturing, general office—size makes no difference.

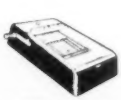
See where *you* can save. Call in your Uarco Representative for a complete survey of your business form requirements. There is no charge for this service—no obligation whatever.

UARCO INCORPORATED

Chicago, Ill.; Cleveland, Ohio; Oakland, Calif.; Deep River, Conn.
Offices in all principal cities

UARCO INCORPORATED
Business Forms

CONTINUOUS-STRIP FORMS FOR TYPEWRITTEN AND BUSINESS MACHINE RECORDS



AUTOGRAPHIC REGISTERS AND REGISTER FORMS

SINGLE SET FORMS

Assured Dependability

FOR HANDLING HEAVY LOADS

THERE'S good reason why experienced users give the call to Hevi-Lifts for their toughest handling jobs. It's the hoist that leads the field in heavy-duty design — that handles full capacity loads dependably — safely — year after year. And without the petty annoyances and breakdowns that cause delays.

When you handle costly loads, you want the best. You need it. And it costs you less in the long run.

P&H Hevi-Lifts are available with 5-step variable speed push-button control, offering a change of pace for all motions in lifting, traveling and lowering. Call in a P&H materials handling engineer, or write for literature.

These *ADDED VALUES* are Standard Equipment on P&H Hevi-Lifts

SAFER—P&H's true motor ratings insure against failure at full capacity loads and speeds. Thermal overload protection prevents motor burn-outs. Control current reduced to 110 volts at push-button. Crane type limit switch and double brakes provide maximum safety.

LIFETIME CONSTRUCTION — Precision construction — shaved gears — grease-sealed bearings — moisture-proof, dust-proof, acid-proof.

SMOOTHER OPERATION — Motor specifically built for hoist service — high starting torque, frequent reversal, etc. Controls loads within a fraction of an inch.

Handle it "thru-the-air" at lower cost

CAPACITIES UP TO 30,000 LBS.

P&H

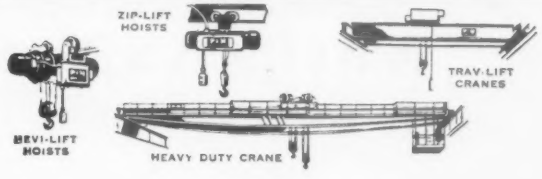
ELECTRIC HOISTS

4525 West National Avenue

Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

HOISTS · WELDING ELECTRODES · MOTORS · P&H · EXCAVATORS · ELECTRIC CRANES · ARC WELDERS



Reverberatory Furnace Operations

GERITY-MICHIGAN CORPORATION

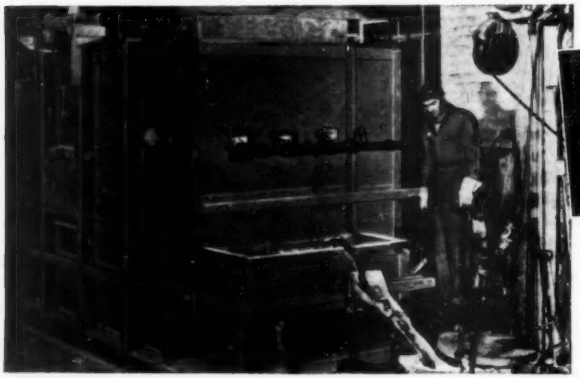
Demonstrate High Temperature GAS Firing Technique

REVERBERATORY FURNACES designed to increase the production of zinc base die casting alloys have expanded melting and alloying capacity almost 50% over conventional pot melting. At Gerity-Michigan Corporation, Detroit, these Gas-fired furnaces operate on practically continuous schedules with savings of 35% to 40% based on time-saving methods and more efficient fuel utilization.

This application demonstrates the flexibility of GAS for industrial heating processes in high temperature ranges. But it also emphasizes the role of GAS in the development of production-line equipment for non-ferrous metals.

R. L. Wilcox, metallurgical engineer and Vice President of Gerity-Michigan Corporation describes the furnace and its application—"**This 18-ton Gas-fired reverberatory furnace has the advantage of extended service life, more efficient fuel utilization, closer temperature control, simplified alloy analysis.**"

Regardless of the type of heating operation or heat-treating process, GAS is the ideal fuel for any temperature requirement, or any production-line application. The characteristics of GAS—speed, flexibility, economy, controllability—are useful features for every industrial heating need. In view of rapid developments it's always worthwhile to keep your eye on what's new in Modern Gas Equipment.



MORE AND MORE...
THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

Gas-fired reverberatory furnace designed and constructed especially for melting and alloying zinc base die casting alloys at Detroit Die Casting Division.

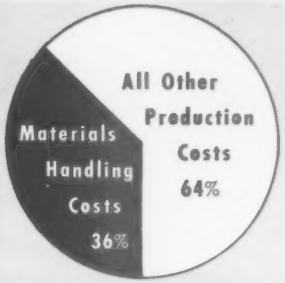
AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE NEW YORK 17, N. Y.

PLANT MANAGEMENT: Start Cutting Costs Here*

General Electric's Authoritative New Movie And Technical Manual Tell You How To . . .

- Make a materials handling survey in your plant
- Plan an integrated materials handling system
- Utilize new materials handling techniques
- Select the best materials handling equipment



*A recent survey of 120 factories disclosed that MATERIALS HANDLING COSTS are 36 per cent of over-all production costs instead of the 25 per cent previously acknowledged.

YOU WILL START REALIZING the full significance of modern materials handling—and how its utilization can help you reduce that 36 per cent of your over-all production costs which doesn't add anything to the value of your product—when you see General Electric's new sound-color movie, "Materials Handling—In Receiving, Warehousing and Shipping." In this movie you will see the materials handling problems of a cross-section of industry—your problems. The solutions to these problems are worked out before your eyes with animated drawings and diagrams.

See how to move materials faster, cheaper by truck, crane or conveyor

STEPS YOU SHOULD TAKE to correct existing conditions are all outlined completely, concisely in the 92-page technical manual which supplements the movie. Here is a partial list of subjects covered:

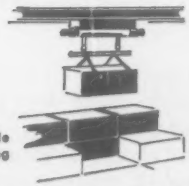
- What is modern materials handling
- How modern materials handling speeds production
- Modern materials handling in receiving, warehousing and shipping
- Unit load shipping system
- Materials handling equipment and applications
- Pallets, skids and containers
- How to make a materials handling survey
- Engineering data on conveyors, cranes, hoists, trucks

See how to utilize the special pallets built to suit your particular needs

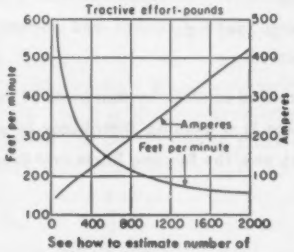
See how to cut demurrage by shipping in unit loads

THIS MOVIE AND MANUAL are the newest additions to General Electric's MORE POWER TO AMERICA program, designed to help industry cut costs through more electrification. You are invited to see it at your earliest convenience. Arrangements can be made through your materials handling equipment supplier, utility, your G-E representative, or simply by returning the coupon below.

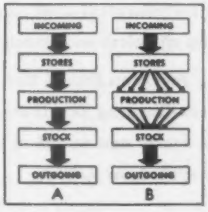
Don't delay! See it soon! This Materials Handling Program may show you the way to LOWER HANDLING COSTS - - GREATER PRODUCTION - - INCREASED PROFITS.



See how to use all available warehouse space by stacking and tiering properly



See how to estimate number of trucks required in your handling system



See how to make a work-simplification chart

More Power to America

GENERAL ELECTRIC

General Electric Company, Section E668-69
Apparatus Department, Schenectady, N. Y.

☐ Please make arrangements for me to see the full-color and sound film "Materials Handling—In Receiving, Warehousing, and Shipping"

☐ Please send me a copy of your Materials Handling manual. Enclosed find $1.25

Name.....

Position.....

Company.....

Address.....

City..... Zone..... State.....

Bunting Precision Bronze Bars are of SAE 660 Bronze, preferred by experienced design, production and maintenance engineers as the finest all-purpose bearing bronze.

The metallurgical structure of Bunting Bars is the responsibility of a competent metallurgical staff supervising foundry control and constantly checking chemical and structural correctness.

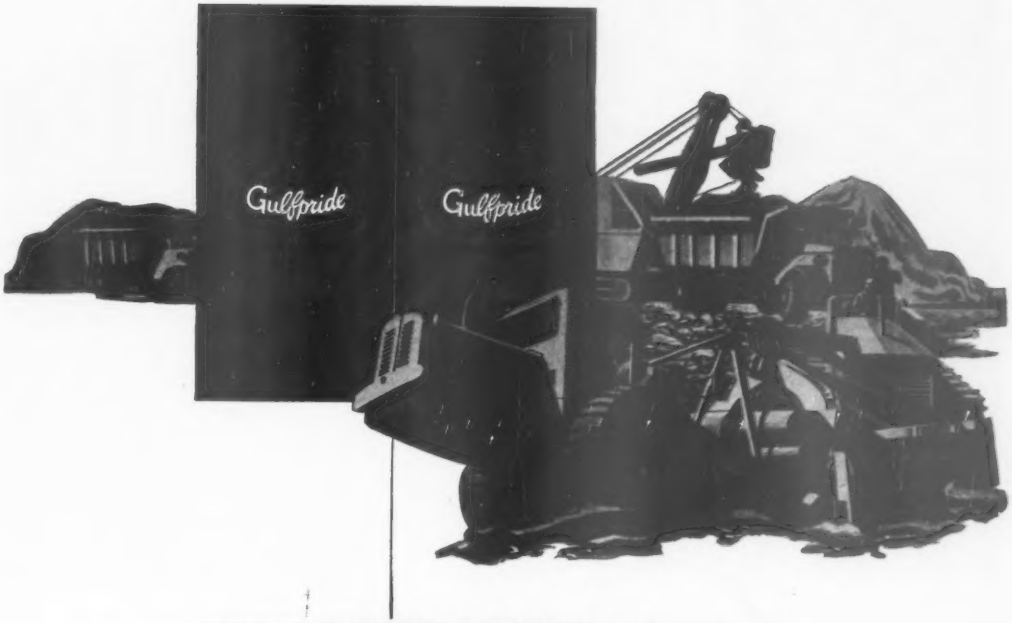
Bunting Precision Bronze Bars are carried in stock by hundreds of Bunting Stock-Carrying Distributors. There is a Bunting Distributor in your vicinity, ready and qualified to serve you. The Bunting Brass and Bronze Company, Toledo 9, Ohio.

41

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

How industry makes multiple savings with Gulf Quality Oils and Greases:



GULF LUBRICANTS *help contractors do a speedier, more profitable job*

Earth-moving contractors are very particular about the lubrication of their equipment. For breakdowns cause delays that may prevent finishing the job on time—may mean penalty payments.

It is significant that scores of leading contractors—including a large percentage of those who handle the big tough jobs—select Gulf quality lubricants to protect their trucks, tractors, bulldozers, and other heavy duty equipment.

For gasoline engines, the usual choice is Gulfpride, the world's finest motor oil. For Diesel engines, it's Gulfpride Diesel, the world's finest Diesel oil. These outstanding oils contribute to top engine performance, fewer delays, lower maintenance costs—help beat contract schedules!

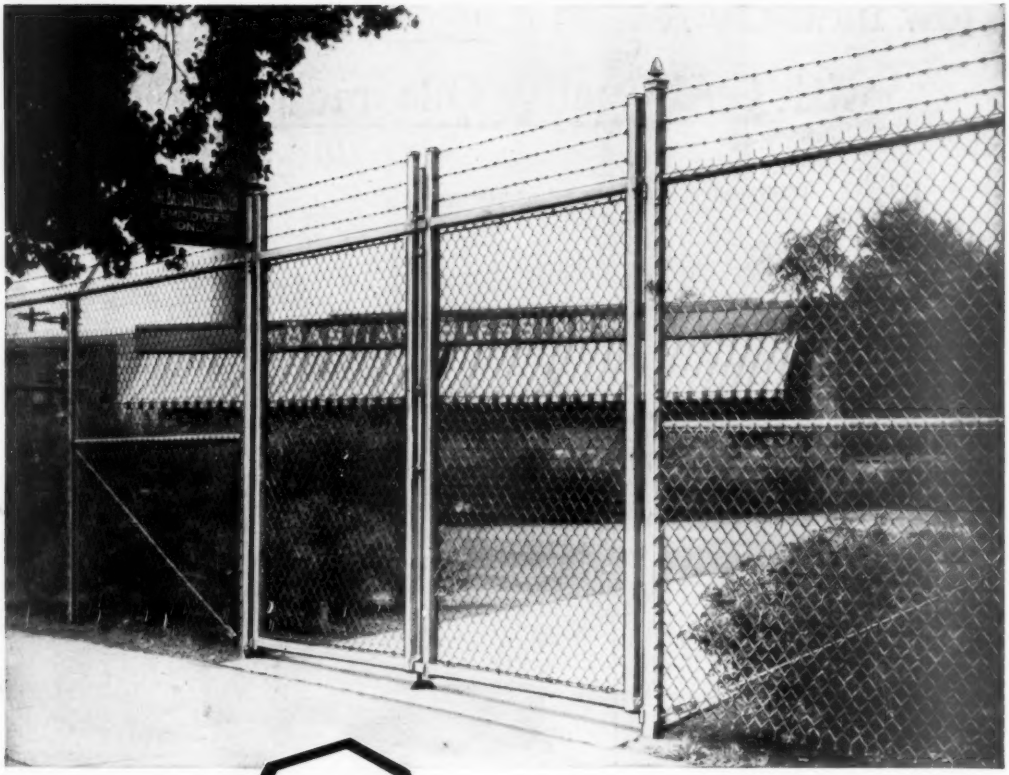
In every industry, Gulf quality lubricants help operating men make multiple savings through improved lubrication. For effective assistance on your lubrication problems, write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:
Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost



Puts a STOP to Trespassing!

Like a tough, durable sentinel, an Anchor Chain Link Fence will keep your plant grounds and buildings free of trespassers, snoopers, agitators, all kinds of trouble-makers. It is made in a wide variety of heights and styles. One of our trained Anchor Fence Engineers can recommend the installation best suited to your needs.

In addition, an Anchor Chain Link Fence enables you to make full use of outdoor space with utmost safety, for storing materials and supplies . . . thus freeing factory space and making it unnecessary to build at this time. And it will help you direct a lot more systematically the flow of motor traffic and employees in and out of your plant.

Extra life and greater protection are built into every Anchor Fence through several time-tested, *exclusive* features. *Deep-Driven Anchors* are an example. They are clamped to the posts at right angles to the fence line, driven deep in the subsoil to hold the fence erect and in line at all times. Ask your local Anchor branch for more details, or write for the informative booklet shown below, to: ANCHOR POST FENCE DIVISION, Anchor Post Products, Inc., 6620 Eastern Ave., Baltimore 24, Maryland.

Write today for your copy of
FREE ILLUSTRATED CATALOG

Contains structural diagrams, specification tables, installation photos of many types and uses of Anchor Chain Link Fence in leading plants all over the country.

Anchor Fence

Nationwide Sales and Erecting Service

THE GOOD RIGHT HAND OF INDUSTRY

Worthington CN Centrifugal Pump—its short oversize shaft means better service, longer life.

It's Versatile . . .

takes whatever drive is

handiest

Meet the "any-drive" pump--the new Worthington CN many-purpose Centrifugal that can be driven by the most convenient means available.

It's another general utility pump like the famous Monobloc—but without the motor. The liquid end is mounted on a frame, from which the shaft extends to be coupled to a motor, fitted with V-belt sheave, or what have you. In an emergency, you can quickly shift to another type of drive.

More Pumps "Across the Board"

Worthington, world's largest manufacturer of pumps, makes all types, all sizes of standard pumps — steam, power, rotary, centrifugal. The one you select is "job ready"—available from stock—to do your kind of work better and for less money.

Immediate Delivery

Call your Worthington distributor—your local "good right hand of industry"—listed in Thomas' Register at "Pumps". He has ample stocks supported by factory stocks for prompt delivery. And send coupon for free bulletin, showing why, in pumps, *there's more worth in Worthington.*

WORTHINGTON

MERCHANDISING DIVISION

The Good Right Hand of Industry

POWER TRANSMISSION: sheaves, V-belts, variable speed drives

PUMPS: centrifugal, power, rotary, steam

COMPRESSORS: horizontal, radial, vertical

Worthington Pump and Machinery Corp.
Merchandising Division, Dept. D816
Harrison, New Jersey

☐ Send latest bulletin on Worthington Centrifugal Pumps. Any other (type).....

Name.....

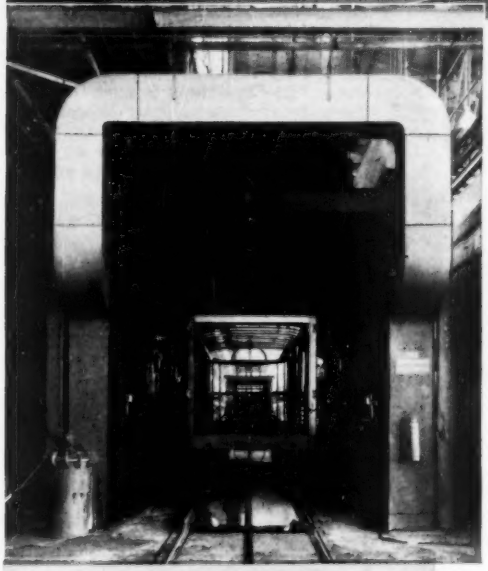
Company.....

Address.....

D-16

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



The Top Illustration Shows Mahon Hydro-Filter Spray Booths in Three Prime Coat Painting Production Lines in the Fruehauf Trailer Company's New Plant, Avon Lake, Ohio. Bottom Illustration Shows Completely Assembled Chassis and Body Skeleton Framework Receiving Prime Coat of Paint in one of the Spray Booths Illustrated Above.

. . . Truck-Trailers Too, Receive Their Finish In MAHON Finishing Systems!

The Mahon Finishing System installed in the Fruehauf Trailer Company's new plant at Avon Lake, Ohio, is another excellent example of Mahon Finishing Equipment engineered into a straight line production system to handle completely assembled Truck-Trailers. This complete system in the plant of the world's largest producer of Truck-Trailers, is 1750 feet long and consists of thirteen Hydro-Filter Spray Booths, with Filtered Air Supply, and five Finish Baking Ovens. The prime coating is done on three production lines which converge into two production lines for the finish coat painting and baking operations. If you are contemplating new, modern finishing equipment, remember that Mahon has pioneered development in this highly specialized field for twenty-eight years . . . this broad experience in every industry, coupled with constant development research, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. Better planning, better engineering, and a better and more economical job of finishing is the result. See Sweet's Mech. Ind. File for complete information.

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Mich. • Western Sales Div., Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, Drying and Baking Ovens, and Paint Reclamation Units. Also Core Ovens, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

MAHON

THIS IS *The* BELL *Prime-Mover*

A half-ton truck in performance . . . a wheelbarrow in economy

Allegheny Ludlum Steel uses the Prime Mover to haul foundry sand.

American Brake Shoe Company uses it to haul iron foundry scrap.

The Austin Company pours concrete mix with its Prime Movers.

● With it, one man can do as much work as a four-man wheelbarrow gang . . . faster . . . with less effort . . . at a fraction the cost.

Adaptable to any bulk materials . . . sand, gravel, dirt, concrete, grain, steel scrap. Equipped with platform, it hauls such things as electric motors, reels of wire, rolls of fabric or paper, concrete blocks, tile, brick.

With its blade, it smooths driveways, plows snow, grades lawns.

And hundreds of other companies have found innumerable uses for this highly versatile "grandson of the wheelbarrow" . . . among them:

General Electric Company	Rockford Paint Company	Lima Locomotive Works
E. I. duPont de Nemours	Yates Lehigh Coal Company	Schlitz Brewing Company
American Smelting and Refining	General Motors Corp.	Rose Hill Memorial Park
B. F. Goodrich Company	Consolidated Iron-Steel Co.	Michigan Food Supply
Republic Steel Company	Rutland Fire Clay Co.	Donner-Hanna Coke Company

A PRODUCT OF BELL *Aircraft* CORPORATION

★ PATENTS AND T. M. REG. PENDING. COPYRIGHT, 1948.

FEATURES:

- Takes half-ton loads up 20% grades.
- Bucket holds 10 cu. ft. . . . 18 with sideboards.
- Gear driven . . . no belts or chains.
- Fully enclosed engine protected against dirt and moisture.
- Clutch, engine, transmission all run in oil.
- Half-ton platform body available; also 50-inch "baby bulldozer" blade.
- Switch from bucket to platform without tools . . . in less than a minute.
- Turns in its own length (63½"); width 31½".
- 3-gallon tankful of fuel gives 8 hours continuous service.

SEND FOR MORE FACTS

Bell Aircraft Corporation
P. O. Box 1F1, Buffalo 5, N. Y.

Please send me facts on how the Prime Mover can be used profitably in my business. We are in the

.....(business).

Name .....

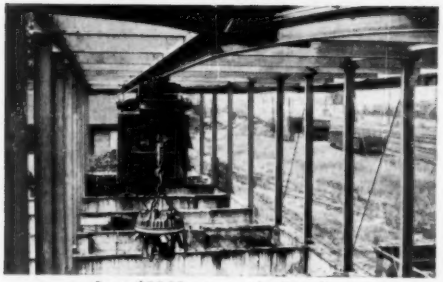
Company .....

Address .....

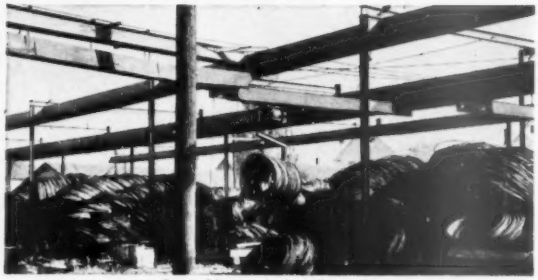
City, Zone & State .....

MOVE HEAVY LOADS ON MONORAIL

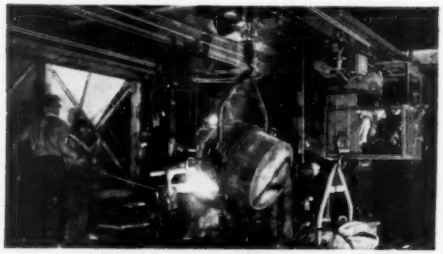
FOR LOWER COST HANDLING



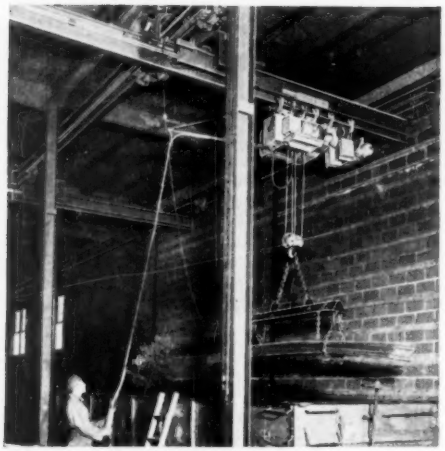
Saves $25.00 per car unloading pig.



Saves 32c per ton handling rod.



Delivers metal with 60% less labor.



Increased tonnage of steel handled.

Tough jobs to handle are naturals for MonoRail. Any American MonoRail system increases plant capacity and production pace, conserves skilled labor, reduces damage and accidents and SAVES YOU MONEY.

Any system, regardless of how complicated, will pay for itself in time and money saved. One company reports a savings of 86% in handling costs.

Whatever your handling problem may be, there is an American MonoRail system adaptable to it. From the simplest hand-operated unit to the most complicated fully automatic system, American MonoRail engineers can suggest a system best suited to your problem.

SEND FOR BULLETIN C-1. A 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVENUE CLEVELAND 7, OHIO

CHECK TOLERANCES

FROM "TENTHS" TO "HUNDREDTHS"

BY SIMPLE TURN OF GRADUATION SELECTOR

Only Brown & Sharpe Electronic Measuring Equipment offers this advantage

By the simple turn of a graduation selector, you get accurate readings in the desired increment from .0001" to .00001", on Brown & Sharpe Electronic Measuring Equipment. No further manipulations! The amplifier unit below shows the range. In addition, intermediate settings can be made easily to match prescribed tolerance limits.

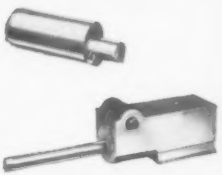
The *true linear response* of the amplifier permits accurate calibration of scale graduations. Its versatility particularly simplifies special applications in production inspection and sorting devices.

Other exclusive advantages of Brown & Sharpe Electronic Measuring Equipment include a simple, self-checking device on the External Comparator . . . no gage blocks needed . . . and a constant zero setting regardless of changes in increments of measurement. Investigate all advantages of this quality-control aid. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

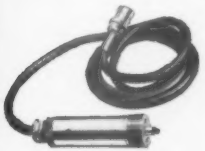
External Comparator No. 951

Range, 0-4". Simplified setting. One master only. Reversible anvil. Self-checking. Shock-protected. Diamond gaging point.



Internal Comparator Attachment No. 952

Range ½" to 2". Frictionless. No pivots to wear. One master only. One measuring point and measuring bar serve any plug.



Gage Head Cartridge No. 953

For mounting in jig or fixture. Its range of measurement is .002" with a small added over-travel which measuring point makes. Frictionless. Dust and moisture proof.

Signal Light Attachment No. 958

Optional Equipment. Speeds operations. Provides visual indication of work size. Easily and securely attached.

BROWN & SHARPE

Any V-BELT Changes Shape *when it Bends*

Prove this yourself!

That's Why the CONCAVE SIDE...

(U. S. PATENT NO. 1813698)

Gives You 2 Big SAVINGS!

Bend *any* V-Belt and *f e e l* it change shape. The top, under tension, *narrows*. The body, under compression, *widens*. The sides of the belt bulge out.

Straight-Sided V-Belt

Straight-Sided V-Belt Bulges in Sheave-Groove.

The result, if the belt is built with *straight* sides, is a shape that does not fit the sheave groove — as shown in Figures 1 and 1-A, above.

Now, bend the V-Belt built with the precisely engineered Concave Side (U. S. Patent No. 1813698) — the Gates Vulco Rope.

Gates Vulco Rope With Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

You get the same shape change but *now* the new shape *exactly fits* the sheave groove as shown in Figures 2 and 2-A.

Results— (1) *Uniform* side-wall wear; *longer* life. (2) *Full* side-wall grip on the pulley; carries heavier loads and sudden load increases without slippage—a big increase in drive efficiency—saving belt wear a n d also saving power!

REG. U. S. PAT. OFF.

The Mark of SPECIALIZED Research

The Concave Side is MORE IMPORTANT NOW Than Ever Before

Because the *sides* of a V-Belt are what actually *drive* the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley *directly* through the belt's side-walls.

Now that Gates *SPECIALIZED* Research has m a d e available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side naturally delivers greater savings today than ever before.

4812

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U. S. A.
"The World's Largest Makers of V-Belts"

It's NEW - It's Sensational

The SMALLEST "O" or "I" Size Magnetic Made

ONLY 6 3/16" x 6 11/16" in size of enclosure — *half the size* of vertically-operated magnetics — this Type "RA" Starter is new throughout. Sturdy, dependable, *incomparably compact.*

The *new principle* design with balanced mechanism provides a free-floating magnet with guided contact alignment. Lever and fulcrum action multiplies the leverage, transfers magnet pull from vertical to horizontal plane and increases contact pressure.

Designed for straight-through wiring, with separate contact enclosures. Embodies all the high-efficiency features found hitherto in the Size 3 and Size 2 "RA" Starters.

ARROW AH HART

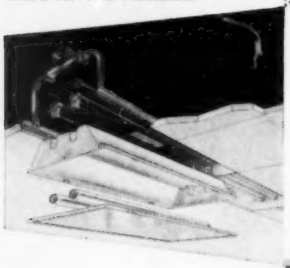
This New *Size "0"* or *"1"*, Type "RA" provides local control for motors rated 5 H. P., 220 Volts and 7½ H. P., 440 or 550 Volts. Write at once for descriptive folder on this foremost advance in space-saving motor controls.

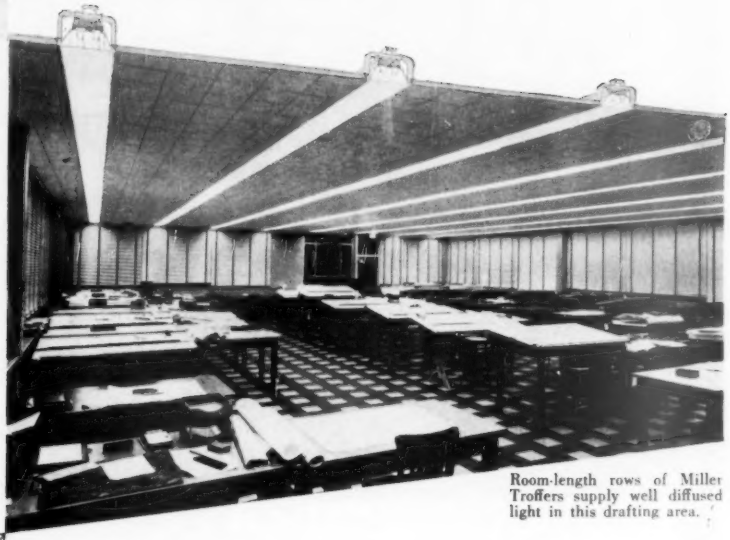
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD 6, CONN., U. S. A.

It Pays to Plan Lighting at the Drawing Board the MILLER Way

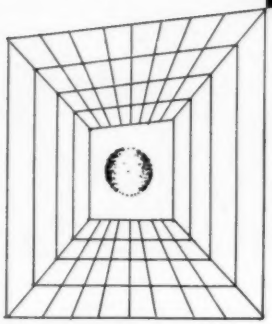
1

All parts are of quality construction. Channels are Bonderized for rust resistance.





Room-length rows of Miller Troffers supply well diffused light in this drafting area.



IT PAYS — because, besides providing the good lighting required, Miller Fluorescent Troffer Lighting Systems are a definite structural aid, most flexible for working out esthetic ceiling design and insuring architectural harmony . . . "CEILINGS UNLIMITED".* IT PAYS — because their wide range of reflector enclosures meet the lighting requirements of varied interiors. IT PAYS — because installation is simplified by Miller patented Ceiling Furring Hanger.

Miller lighting service is all-inclusive. It covers the needs of planned commercial and industrial lighting. Miller field engineers and distributors, conveniently located, are at your call.

THE miller COMPANY
SINCE 1844
ILLUMINATING DIVISION, MERIDEN, CONNECTICUT

ILLUMINATING DIVISION Fluorescent, Incandescent, Mercury Lighting Equipment. HEATING PRODUCTS DIVISION Domestic Oil Burners and Liquid Fuel Devices. ROLLING MILL DIVISION Phosphor Bronze and Brass in Sheets, Strips and Rolls

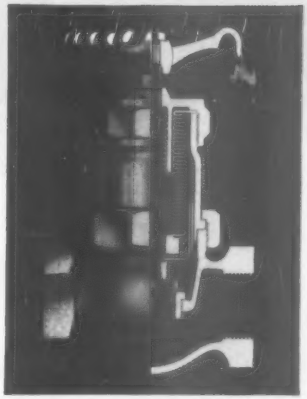
*Reg. Trademark U. S. Pat. Off.

If your "liquid assets" are HAZARDOUS

—YOU NEED SYLPHON PACKLESS VALVES

Hazardous leaks, even tiny ones, can be *stopped for good* . . . with Fulton Sylphon Packless Valves. Installed on pipe lines carrying gasoline, oil, or other volatile liquids or vapors, they protect you and your equipment against waste, explosion, fire, other damage. The valve's dual-ply, seamless Sylphon metal bellows replaces customary packing . . . eliminates leakage that can seep past the stuffing box of an ordinary packed type valve. The bellows provides a positive seal—is metal-housed for protection against erosion. Available in many sizes and types with body made of brass, bronze, cast iron, cast steel, stainless steel or monel.

Widely used in chemical plants, oil refineries, power plants, aboard ships—or wherever steam, air, gases or liquids are handled. Write today for Bulletin AD-813.



No. 304-N Sylphon Packless Valve comes in sizes from ½" to 2" for pressures up to 150 lbs. Also available in larger sizes is No. 1304 with flanged connections for liquid pressures up to 80 lbs. No. 304-NV is ideal for vacuum service.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

TWO GREAT NAMES...DODGE-TIMKEN!

It was Dodge who took the famous Timken Bearing, mounted it, sealed it, housed it and delivered a pillow block of new high quality—fully assembled, ready to lock on the shaft and carry the power loads of industry with new efficiency.

Dodge develops *outstanding* power transmission products, as proved by the big success of Dodge-Timken Bearings on millions of industry's toughest jobs.

Dodge-Timken Bearings are supplied promptly from stock in four basic types and a wide range of sizes to meet an almost limitless variety of anti-friction problems.

Dodge also produces Ball Bearing Pillow Blocks which, with Dodge-Timken Bearings, comprise the famous "30,000 hour line." Write for complete bulletins.

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

He is your local Dodge Distributor—factory trained—qualified to suggest ways to improve your machine performance, increase production. Look for his name under "Power Transmission Equipment" in your classified phone book.

Copyright, 1945, Dodge Mfg. Corp.

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

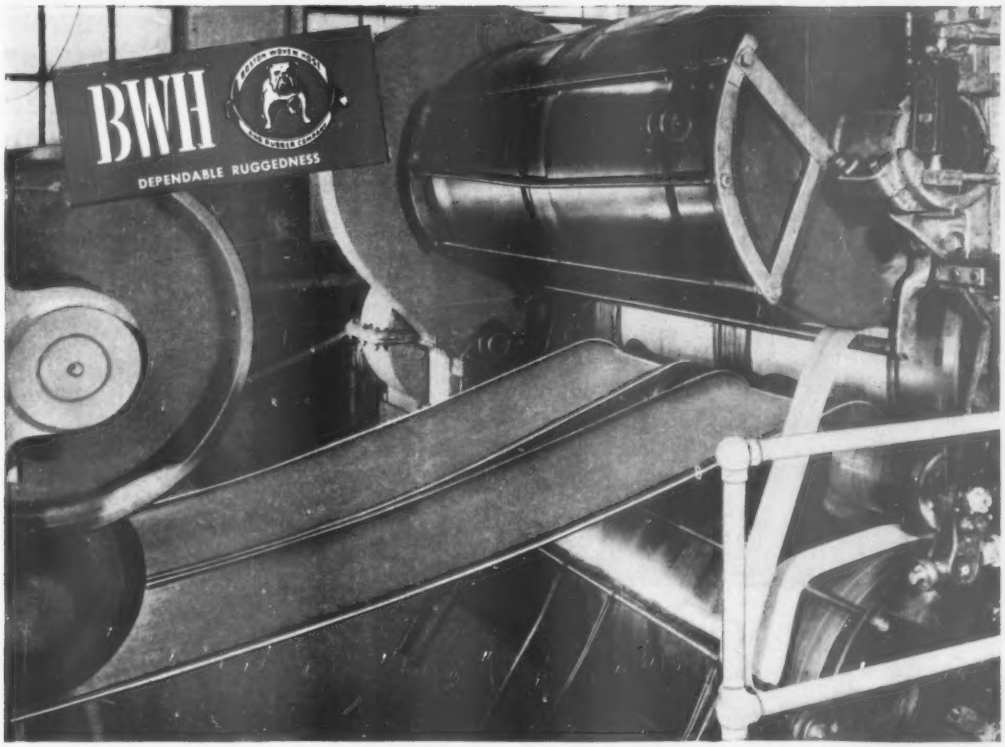


Photo Shows BWH Conveyor Belts Being Produced by the ROTOCURE Process of Continuous Vulcanization.

ONLY BWH BELTS

give you all the advantages of the ROTOCURE Process of Continuous Vulcanization

Industrial users have long recognized the potential faults in belts made by the old flat press process. By this method of vulcanizing, successive 30-foot segments of uncured belts are inserted in the flat press, stretched and vulcanized. Of necessity, the joints are overlapped in the press, resulting in overcuring. This may cause operational weakness in the belt.

15 years of tough, on-the-job testing has definitely proved that belts made by the famous ROTOCURE Process have many distinct advantages over flat-press cured belts, resulting in increased operating efficiency and lower maintenance costs.

Among these advantages are the following:

1. ROTOCURE eliminates press overlaps or overcured segments, through continuous vulcanization. Actual tests prove press overlaps may reduce flex-life as much as 40%.

2. ROTOCURE eliminates mechanical distortion, which occurs at the press ends in the flat-press method of curing.

3. ROTOCURE eliminates uneven stretch, because this process maintains constant, uniform stretch control throughout the curing of every inch of BWH Belts.

4. ROTOCURE eliminates from transmission belts, the dusting agents necessary in flat-press curing to keep belts from sticking to hot platens. Thus BWH Transmission Belts have a higher coefficient of friction, resulting in lowered operating tensions . . . prolonged belt life.

5. ROTOCURE eliminates non-uniform covers in conveyor and elevator belts, because this process never overcures any part of the belts. Thus the rubber covers of BWH Conveyor and Elevator Belts are uniformly abrasion-resistant.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1071, BOSTON 3, MASS.

Mercury

brings you 38 years material handling experience!

ORIGINATORS OF THE MERCURY "TRACKLESS TRAIN" SYSTEM OF MATERIALS HANDLING

"JEEP" FORK TRUCK
2000 lbs. capacity

"YANK" FORK TRUCK
6000 lbs. capacity

"YAK" FORK TRUCK
4000 lbs. capacity

"Jeep" Sit Down, Center Control Fork Truck, 2000 lbs. capacity. Compact design affords easy manipulation in confined areas.

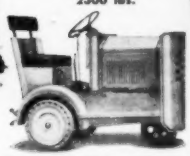
"Yak" Center Control Fork Truck, 4000 lbs. capacity. Rugged design.

"Yank" Center Control Fork Truck, 6000 lbs. capacity. Designed for tough continuous service.

"TUG" ELECTRIC TRACTOR
Max. D.B.P. 2500 lbs.

A-310
Castor Steer
TRAILERS

"BANTY" GAS TRACTOR
Max. D.B.P.
2300 lbs.



"Tug" Electric Tractor: A powerful compact tractor available in "Twin-wheel" and "4-wheel" models, medium or heavy duty.

"Banty" Gas Tractor: The most compact tractor made, yet develops a draw bar pull in excess of 2000 lbs. Thousands now in use.

"Huskie" and "Super-Huskie" gas tractors (not illustrated) 4 and 6 wheel heavy duty models.

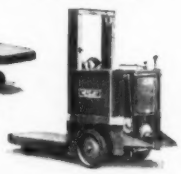
Trailers: Available in castor or 5th wheel steer, platform or side dump types.

SEE US AT THE SHOW

Booth 324-325 • National Materials Handling Exposition
Convention Hall—Philadelphia January 10-14

"STANDARD" HIGH LIFT
6000 lbs. capacity

"JUNIOR" LOW LIFT
4000 lbs. capacity



"SENIOR" HIGH LIFT
4000 lbs. capacity

"Junior" Models: Narrow design. Low, high or telescopic lift. 3000 or 4000 lbs. capacity.

"Senior" Models: Low, high or telescopic lift. 4000 lbs. capacity.

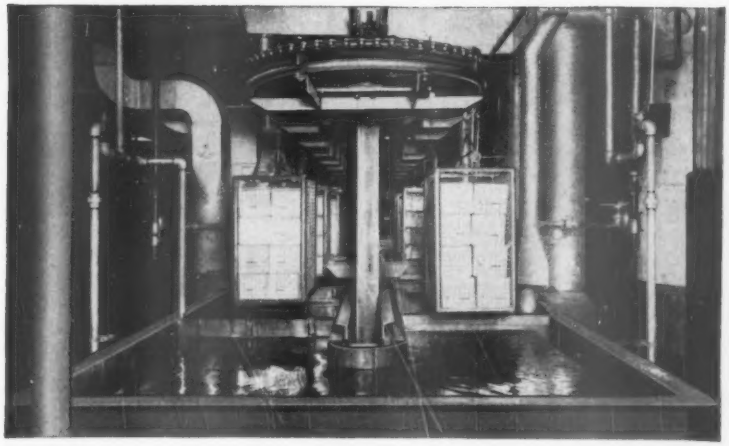
"Standard" Models: Low, high or telescopic lift, 6000 lbs. capacity.

"Mogul" (not illustrated) Heavy duty. Low or high lift. Capacity, 10,000 lbs.

FREE: Catalog No. 7-11 New 52 page catalog illustrates and describes complete Mercury line. Request your copy on company letterhead today.

MERCURY

THE MERCURY MANUFACTURING CO.
4110 S. Halsted St., Chicago 9, Ill.



How would YOU have solved this metal-finishing problem ?

The Story: Because of shortages of steel, Minneapolis-Honeywell decided to use aluminum for its regulator covers. But this change introduced a knotty problem . . .

The Problem:

Since aluminum does not bond paint to itself firmly, a process had to be worked out by M-H engineers to inactivate the metal's surface and permit an adherent paint-to-metal bond. This process involves several cleaning, rinsing and chemical-bath operations before painting can be done. *How to turn out regulator covers in mass production—involving this multiple-stage process?*—that was the problem.

The Solution:

"Why not adapt a Udylite Fully Automatic Plater?" the researchers asked. "This isn't an electrolytic process, to be sure, but it does involve certain chemical-bath operations which must proceed *continuously* and be timed *accurately*." So they did. With these results:

1. *The Udylite plater's fully automatic mechanism provided the* continuous *production-line processing needed.*

2. *The Udylite machine's hydraulically-actuated immersion mechanism made it possible to adjust the speed of immersion and withdrawal of the work* individually *and* accurately *to the requirements of the individual run.*

3. *Straight-up-and-down raising and lowering of the work saved 18" to 24" of tank per transfer, prevented "floating off," and assured adequate drainage of solution from work parts.*

4. *MASS-PRODUCTION WAS ACHIEVED; THE MACHINE TURNS OUT 25,000 REGULATORS PER HOUR.*

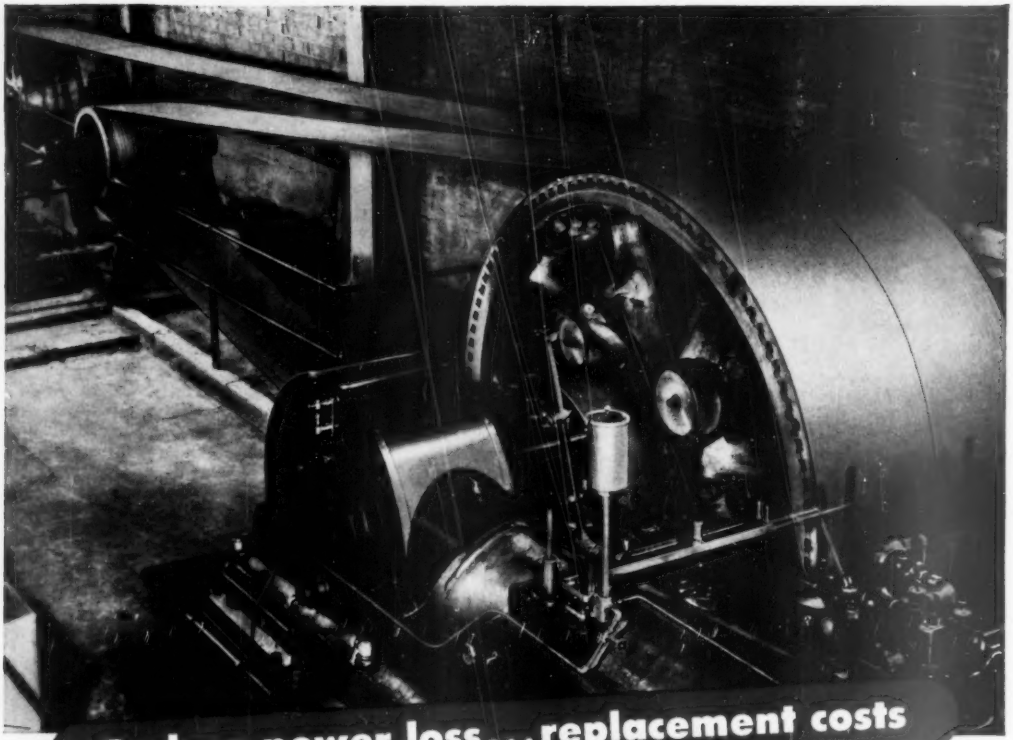
Is yours a problem involving automatic plating? better finishing? more output?

If so, call in the Udylite Technical Man, describe your problem and the results you want, and let him make recommendations. Udylite produces a complete line of plating and metal-finishing equipment—barrel platers, rectoplaters, Fully Automatics, Semi-Automatics, etc.—and laboratory-tested supplies. Our metal-finishing specialists will plan the most efficient process for your operations—without obligation. Call or write us today.

Udylite

PIONEER OF A BETTER WAY IN PLATING

DETROIT 11, MICHIGAN



Reduce power loss...replacement costs

Yes, you *save* on power costs when you use Hewitt's Monarch Amber Transmission Belting.

You won't waste power through belt slippage. And you can depend on the belt for full power even when operating at peak capacity.

This famous, extra high quality belting is made by Hewitt to assure maximum power delivery from drive pulley to driven pulley. You will find that it is especially adaptable for your power transmission operations where severe flexing—due to small pulleys, high speeds, and short centers—is encountered.

Monarch straight-edge Amber Transmission Belting is made of only premium-grade, hard (silver) duck. All plies are embedded—completely insulated with highest quality pure gum rubber compounds—to give you the advantages of greater freedom from stretch. It resists moisture, mildew, grit.

For maximum performance use Monarch Amber Transmission Belting wherever there are heavy shock loads or abuse conditions—in pulp and paper mills, saw mills, mines, stone crushing plants, oil fields, quarries, and other severe transmission operations.

Phone your Hewitt distributor for further details on this unusual new belting. He's listed in the yellow pages of your telephone directory. Or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, N. Y. No obligation, of course!

HEWITT

Transmission Belting

Why Hewitt Monarch Amber Transmission Belting Meets Your Needs

1. Made of highest quality gum rubber compounds and premium-grade, hard (silver) duck.

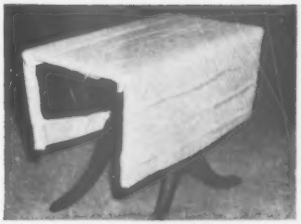
2. All plies straight-laid under uniform tension to insure even stresses throughout the belting.

3. Remarkably flexible and free from stretch because plies are completely insulated with pure gum rubber compounds.

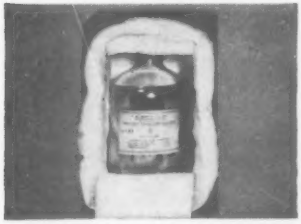
4. No folds, no seams—due to straight-edge construction. Doubles traction life—makes possible use of either side.

HEWITT RUBBER DIVISION **HEWITT-ROBINS INCORPORATED**

Cloud-soft KIMPAK shields this handsome dispenser from damage during shipment. Photo courtesy Temprite Mfg. Co., Inc.



Surface Protection — Drop-leaf table. Photo courtesy Phoenix Chair Company.



Flotation Packaging — Mercury bottle. Photo courtesy F. W. Berk & Company.

Kimpak Float Packaging*

bundles of protection for every product you pack

Ship confidently and save—thanks to reliable, low-cost KIMPAK* creped wadding. A versatile, efficient cushioning material, KIMPAK provides protection in packaging for the smallest, most delicate items to heavy and bulky products. Made in a variety of types, thicknesses and backings to suit your particular needs. You'll find a specification of cushiony KIMPAK to meet every requirement of the Four Basic Methods of Interior Packaging—Surface Protection, Blocking and Bracing, Flotation Packaging and Absorbent Packaging.

Soft, flexible and feather-light—KIMPAK adds little weight or bulk to shipments. It is made either liquid absorbent or liquid repellent. Highly resilient, it effectively withstands shock and vibration. Spotlessly clean, KIMPAK improves the appearance of any package. No wonder so many fine products are wrapped for market with KIMPAK.

Free book for you. Call or write your local distributor for this fact-filled booklet on better packaging methods. He is listed in the Classified Phone Directories. Or, if you wish, merely mail this coupon.

• •

KIMBERLY-CLARK CORPORATION
Creped Wadding Division, Neenah, Wis.

Please send me the free KIMPAK booklet on better packaging methods. FM-149

Name .....

Firm .....

Type of Business .....

Address .....

City, Zone, State .....

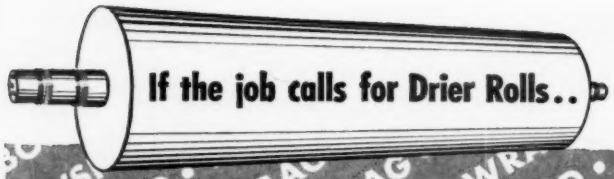
Kimpak

A PRODUCT OF Kimberly Clark

REG. U.S. PAT. OFF. & FOREIGN COUNTRIES

CREPED WADDING

*T. M. Reg. U. S. & Can. Pat. Off.



If the job calls for Drier Rolls..

A SURVEY OF 32 MILLS SHOWS

Lukenweld Drier Rolls are at work with every type of paper

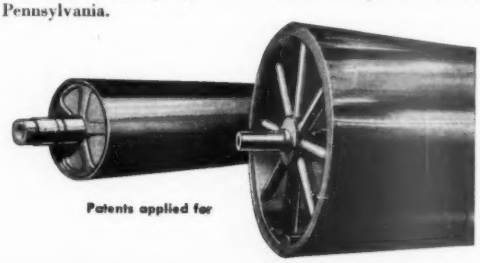
High pressures safely employed with Lukenweld Drier Rolls can be used to boost surface temperatures. "What does that mean when we're working with thinner papers?" millmen have asked. The answer is, Lukenweld Drier Rolls are being successfully used in producing every type of paper listed here. And their users come back for more, time after time.

Lukenweld Jacketed Steel Drier Rolls help speed up production—positive scavenging of steam passages flushes out air and condensate, assuring high efficiency. Product quality is higher because surface temperatures are more uniform and constant. Simple in construction, there's nothing to get out of order; can be designed without bolts, nuts or siphons to work loose in service.

In Chemical, Drug, Food and Plastics work, too

Lukenweld Drier Rolls are serving similarly here—crystallizing drugs and chemicals by heating or chilling, drying or freezing foodstuffs. The ability to transfer heat quickly and evenly provides the same economic advantages to these industries.

If your drying problem can be solved by drier rolls, let our engineers help you select the Lukenweld Rolls to handle it; any diameter, 24 inches or 18 feet—lengths to suit each task—plain steel, polished or plated surfaces, or any of the Lukens corrosion-resistant clad steels. Write Lukenweld, Division of Lukens Steel Company, 421 Lukens Building, Coatesville, Pennsylvania.



Patents applied for

LUKENS
LUKENWELD DIVISION

DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

Roll on with aerol

Now, as a member of the Airquipment family, AEROL offers you...

1. **Increased Production Facilities.**
2. **Spot Deliveries.**
3. **The largest selection of U. S.-made industrial wheels, including a premium wheel with premium features at no extra cost**

the *NEW* absolutely waterproof *AEROL* Wheel, equipped with Bower or Timken Tapered Precision Roller Bearings

Have your distributor show you how Aerol Wheels and Casters can turn your wasted minutes into profits!

NO WHEEL ROLLS LIKE AN AEROL

GUARANTEED 20% EASIER ROLLABILITY!

AEROL CO., INC.

Plant: 1823 E. Washington Blvd., Los Angeles 21, Calif.
Sales Offices: 2820 Ontario Street, Burbank, Calif.

Is Your Product Priced to Sell?

Slash Production Costs With TOWMOTOR MH*

Cut 20% to 30% from present production costs with Towmotor Mass Handling. Rushing raw materials to production lines—speeding finished products to shipping—stacking full loads into overhead storage space—Towmotor is the busiest piece of equipment you'll ever own! Gasoline-powered Towmotor Fork Lift Trucks lift, transport and stack full loads any time, anywhere—operate at *maximum* capacity 24 hours a day, every day. Towmotor handling keeps pace with production. Take a tip from the men who make handling pay a profit: More professional handlers use Towmotor than any other fork lift truck.

*M H is MASS HANDLING—the systematic movement of the most units, in the shortest time, at the lowest cost.

Double and triple savings with standard Towmotor Accessories. However, if a standard Towmotor unit does not solve your handling problem, Towmotor engineers welcome the opportunity to design special equipment to meet your specific needs. Details are available without obligation.

UNLOADER

SEND FOR FREE BOOK!

Towmotor Materials Handling Analysis Guide shows you how to recognize, analyze and solve your handling problems. Send for a free copy.

TOWMOTOR CORPORATION

DIVISION 5

1226 E. 152nd St., Cleveland 10, Ohio

Representatives in all Principal Cities in U. S. and Canada

See Our Exhibit,

Third National Materials Handling Exposition,

Philadelphia, January 10-14,

Booth Nos. 432-3-4, 502-3-4.

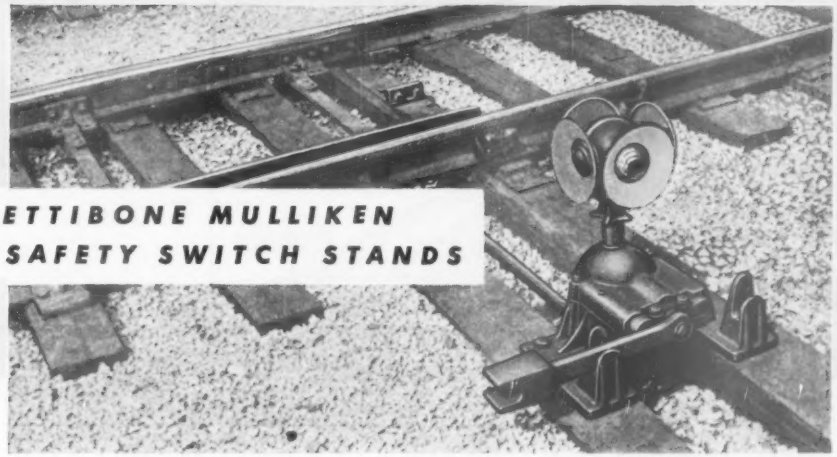
TOWMOTOR

THE ONE-MAN-GANG

FORK LIFT TRUCKS *and* TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Modernize Your *Track Switches* with



PETTIBONE MULLIKEN
HUB SAFETY SWITCH STANDS

it looks like an ordinary switch stand, but

- it permits trailing movements without slowing or stopping for hand operation of the switch—it is automatic, the switch is thrown without damage to the switch or switch stand.
- it eliminates replacement of broken parts caused by running through a switch—it reduces maintenance.
- it does away with tying up yard tracks when an ordinary switch stand would be run through and put out of service—it speeds switching.
- the handle does not swing over when the switch and target move to the new position—it is safe, the handle can not strike a bystander.
- it is fully enclosed as a protection against dirt, snow, and ice.
- it is well built to last indefinitely with minimum attention.
- it is easily installed in place of your present ordinary switch stand.

LEADING RAILROADS USE THESE AUTOMATIC SWITCH STANDS IN SWITCH YARDS
OVER 20,000 IN USE BY RAILROADS AND INDUSTRIAL PLANTS

WRITE FOR
DESCRIPTIVE BULLETIN F-947-HS

"Quality Since 1860"

PETTIBONE MULLIKEN CORPORATION

4700 West Division Street, Chicago 51, Illinois

RAIL BRACES • SHOULDER BOLTS • FROGS • SWITCHES • RERAILERS • SWITCH STANDS • MECHANICAL SWITCHMAN (SPRING SWITCHES)

Obtain HIGH lighting efficiency at LOW maintenance cost

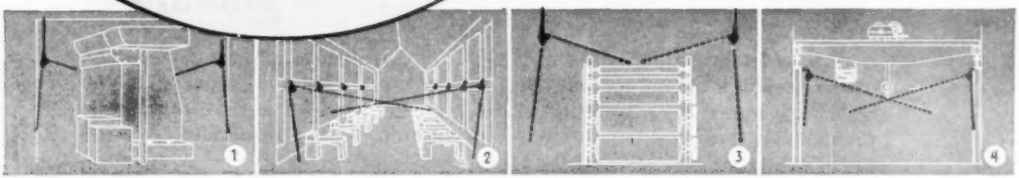
"TURNLOX"* permits detachment of reflector and lamp as one unit.

"SEALED BEAD" CONSTRUCTION resists corrosion.

BENJAMIN LIFETIME PORCELAIN ENAMEL . . . easiest-to-clean . . . increases light output.

TYPICAL LOCATIONS WHERE ELLIPTICAL ANGLE UNITS ARE RECOMMENDED

1. Tall machinery obscures overhead lights from vision.
2. Ceilings too high, need effective light from the side.
3. Must have light on vertical surfaces, such as presses.
4. Overhead obstructions make overhead lighting impractical.



Approved by the most modern industrial lighting practice for many locations!

Thousands of Industrial lighting problems are solved satisfactorily and economically by specifying Benjamin Elliptical Angle Units.

These Porcelain Enamel Units are especially designed for the lighting of many locations, commonly found in industry, where overhead illumination is difficult or impractical due to structural obstructions.

*Also available with SOCKET-REFLECTOR, featuring separable "X" type fitting which allows reflector to be slipped back over conduit.

Outstanding design and construction features contribute to uniform, diffused illumination on both horizontal and vertical working surfaces while shielding the workers' eyes from direct lamp glare.

FREE DATA BULLETIN AVAILABLE giving complete details on a wide size range of Benjamin Elliptical Angle Units (75 watt to 750–1500 watt). Write: **BENJAMIN ELECTRIC MFG. CO., Dept. N, Des Plaines, Ill.**

"TURN-LOX" BENJAMIN Elliptical Angle

PORCELAIN ENAMEL LIGHTING UNITS

DISTRIBUTED EXCLUSIVELY THROUGH ELECTRICAL WHOLESALERS

G-3050B

Did you ever sell SCRAP at a profit?

Your scrap pile holds more than metal. Its costly contents include your dead losses in time and labor operations. Seconds and rejects can only mean increased production costs all along the line.

There is an answer to this . . . Inspection by Dial Indicator Gaging . . . Stop making the parts that won't fit!

Wherever you have a production problem involving a dimension of any kind, you have a use for a Dial Indicator Gage. And a Dial Indicator Gage for that specific job is available . . . This is the *modern* inspection method that enables workers to *see* dimensions, instead of feeling for them. You get *accuracy*—to whatever degree your work requires. Equally important — you get *speed*.

Old-fashioned gaging methods permit too much scrap loss

Dial Indicator Gaging cuts seconds and rejects to a minimum

For example—as pictured at the right—a Dial Indicator permits gaging while grinding, makes possible continuous precision measurement without stopping the machine. This prevents out-of-round, oversize and undersize pieces—reduces inspection time—saves the time formerly needed for resetting sizing controls after wheel dressing. The Arnold Gage, with various accessories, accurately gages outside diameter, inside or outside widths between faces of shoulders, tapered diameters, and work having splines and keyways. For full details, please write for illustrated Bulletin No. **12.**

We make both standard and custom-built gages to meet the needs of users in a hundred industries. For highly specialized needs, we also make Air Gages and Automatic Electronic Sorting Gages. Let us help you with any problem of gaging and inspection. If you will send us blueprints of work to be measured, we will gladly recommend the proper gage. No obligation is involved.

FEDERAL

FEDERAL PRODUCTS CORPORATION
1144 Eddy Street Providence 1, R. I.

YOUR PROFIT DECISION IS *Visible PRECISION**

***The use of Dial Indicator Gages—visible precision—lowers inspection costs, raises production. Federal Products Corporation is America's largest maker of both standard and custom-built gages—mechanical, air, electronic—for the measurement of single and multiple dimensions.**

SAVE 3 Ways

with B-H No. 1 Cement
for insulating valves and other irregular surfaces

Here's the insulating cement that makes it practical to stop heat loss—even on areas that must be occasionally serviced. B-H No. 1 Cement is efficient, easy to use and resists temperatures up to 1800° F.

Faster to use. With B-H No. 1, you simply add water, mix and apply. *It sticks instantly!* It won't slide off bottom surfaces or roll up behind the trowel. Special rust inhibitor prevents pitting and corrosion.

Better coverage. B-H No. 1 is economical to use—with a wet coverage up to 60 square feet, 1-inch thick per 100 pounds! It dries without cracking or peeling. And it's reclaimable up to 1200° F.

Bigger heat savings. B-H No. 1 stops heat loss, even at high temperatures—because it's compounded of *black* Rockwool. For example, a 3-inch application reduces 800° F to 150° F.

There are hundreds of places where you can turn heat losses into profits with B-H No. 1 Cement. Send the coupon for descriptive literature and a working sample.

SEND FOR SAMPLE

BALDWIN-HILL COMPANY
714 Breunig Avenue, Trenton 2, N. J.

Send free sample of B-H No. 1 Cement and 24-page data book "Industrial Relations."

NAME ..... POSITION .....

FIRM .....

ADDRESS .....

.....

Baldwin-Hill

Specialists in Thermal Insulation

B-H MONO-BLOCK | B-H BLANKETS | B-H WEATHERSEAL | B-H FELTS

SAVES $5000 in six months

G-E DIESEL-ELECTRIC LOCOMOTIVE SLASHES FUEL COSTS BY 89% AT TEXAS PAPER MILL

When the Southland Paper Mills put this snappy 45-ton diesel-electric locomotive into operation at the Lufkin, Texas plant about a year ago, the company did so on the strength of a modest savings estimate of $15 a day made by G-E engineers. Since then this cost-smashing locomotive has almost doubled this estimate *in just fuel savings alone.*

During six months' operation the diesel-electric saved $5000, at the rate of $27.65 per day. This is based on the $3.35 per day fuel cost for the G-E 45-tonner, compared with the daily $31.00 cost of bunker fuel oil for the replaced steam locomotive.

FIRE HAZARD ELIMINATED

In addition to savings, the G-E switcher furnished these other benefits. The absence of sparks reduced the danger of setting paper and pulp wood on fire. There's no longer any need to take time for watering. No watchman is required to maintain a head of steam.

Seven days a week, this peppy locomotive switches cars at the push of a button, often handling 15-car strings weighing over 1200 tons.

YOUR SAVINGS ESTIMATED

If you want to cut costs in your own plant, find out how many dollars one of these standard locomotives will bank for you each year. Mail the coupon for more information. No obligation of course. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

See our 25-ton locomotive in the G-E booth at the National Materials Handling Exposition, Philadelphia, January 10-14.

DO YOU HAVE THESE FACTS ON LOW-COST SWITCHING?

Section AD-4909
General Electric Company
Schenectady 5, N. Y.

- Operating Results
- Graphs
- Tables

FREE BULLETIN

Without obligation send me your fact-filled locomotive bulletin "Switch to Diesel-electrics and Save."

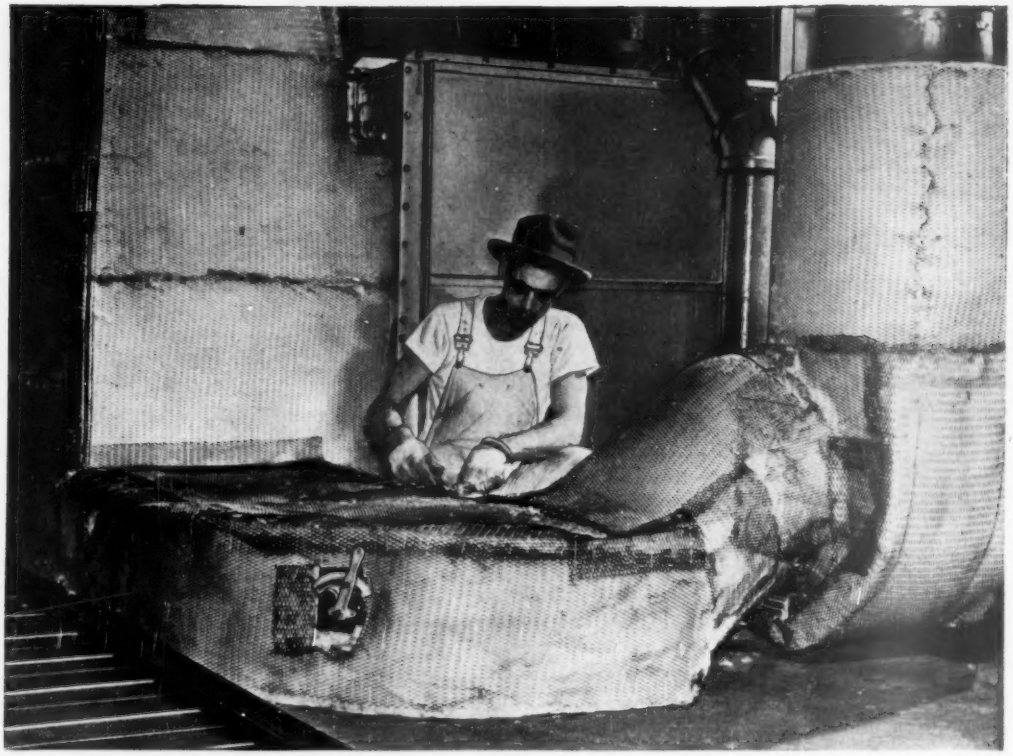
NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

GENERAL ELECTRIC



FIBERGLAS*

...a star performer in industry's hot spots

Wherever you find hot spots—those "we-can't-afford-heat-loss" points in the plant—you'll find Fiberglas Insulating Blankets right for the job.

Why? Because they save installation time, they save fuel—and they save money. That's the proved-in-use experience at many of the country's important plants—on industrial ovens, boilers, ducts, breachings, retorts—and a long list of specialized processing equipment.

The high thermal insulating efficiency of Fiberglas results from the countless tiny air spaces enclosed in a lightweight, wool-like blanket of long, fine fibers of glass. Here is a material that will not burn, rot or decay—is non-corrosive and will not corrode metals. Fiberglas insulation holds together, is resilient, will not settle under vibration.

This basic material is further processed into blankets that meet the requirements of industry for insulating hot surfaces up to 1000° F. In the illustration, Fiberglas Insulation has been fabricated with a metal mesh exterior surface to facilitate application and provide a base for insulating and finishing cements.

Get all the facts about Fiberglas blankets—their many forms and uses. Write for "Fiberglas Insulations for Industry" . . . Owens-Corning Fiberglas Corporation, Dept. 861, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario

OWENS-CORNING
FIBERGLAS
THERMAL INSULATING MATERIALS

*FIBERGLAS is the trade-mark (Reg. U. S. Pat. Off.) for a variety of products made of or with glass fibers by Owens-Corning Fiberglas Corporation.

Top-notch manufacturing facilities are important, certainly . . . and Allied has them in four completely equipped plants. What is more important, however, is manufacturing *ability* which should be reflected in every phase of operation. Perhaps this is recognized in the skilled, capable hands of machine operators . . . but that is only part of the picture. Capable hands directed by intelligent thinking must be at work in *every* department—management, engineering, production, and even where routine clerical work is done.

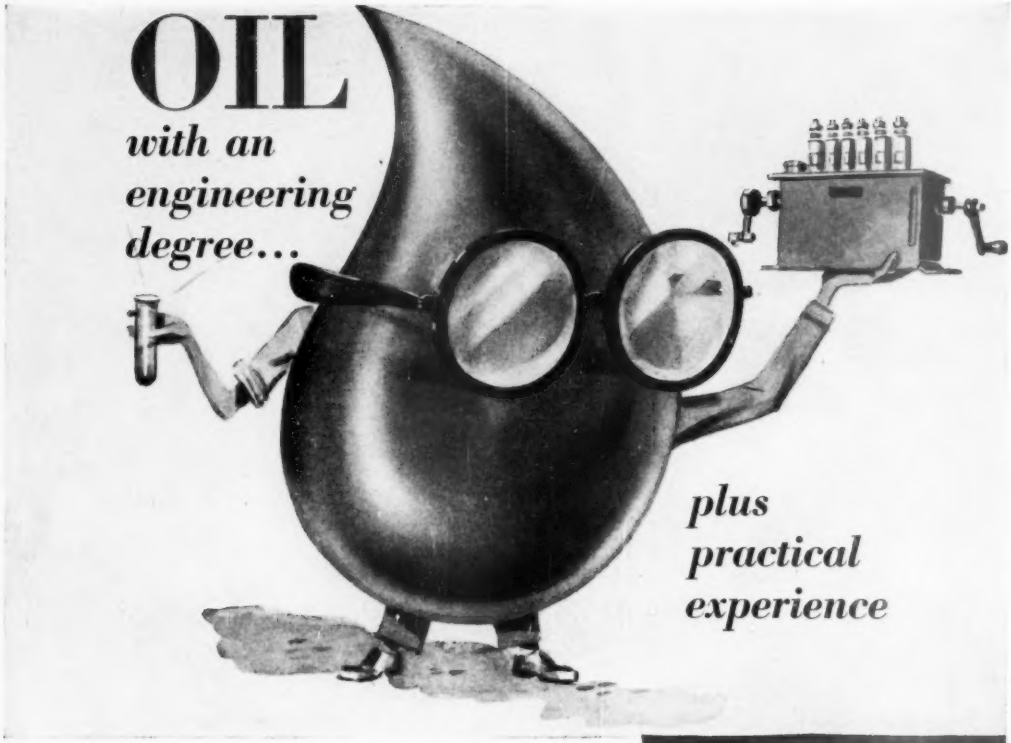
You'll find the picture complete at Allied.

ALLIED PRODUCTS

DEPENDABILITY

ALLIED PRODUCTS CORPORATION
DEPARTMENT 43
4632 LAWTON AVENUE • DETROIT 8, MICHIGAN

HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS
SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC
MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES



INCREASES YOUR PRODUCTION REDUCES YOUR COSTS

YOU can be sure of real help in increasing production, improving product quality and reducing costs when you use Texaco Lubricants and Lubrication Engineering Service. This combination of high engineering skill and practical lubricating know-how is producing these benefits for manufacturers in every field.

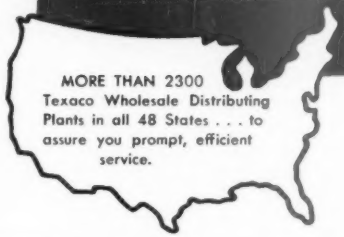
A telephone call will bring a Texaco Lubrication Engineer to your plant with full information. Let him work with your production men. He'll gladly help with specific, practical lubrication recommendations to increase efficiency and economy.

Make that call *now*—to the nearest Texaco Wholesale Distributing Plant. Or write, The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO BRANDS ARE SOLD ON PERFORMANCE

Texaco Lubricants assure outstanding efficiency and economy wherever used. That's why they are first choice in so many fields of industry. That's why for instance—

More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.



TEXACO Lubricants, Fuels and Lubrication Engineering Service

Tune in...TEXACO STAR THEATRE presents MILTON BERLE every Wednesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

"Give us the tools . . ."

What Are *YOUR* Chances If There Are No Profits?

Since the November 2 election there has been a dazzling variety of plans to have the government do more and more things and spend more and more money. But there is almost no variety in the plans which are suggested to raise the money.

"Pay for it by taxing profits," is the standard refrain. Slap on an "excess" profits tax. Boost the corporations' income tax rate.

Well – why not? Haven't the corporations been making so much money that a big chunk of it can be turned over to the government spenders without hurting anybody?

The answer is no!

How high profits should be can be debated endlessly. Some people claim that 1948 corporation profits, which will amount to about $20 billion, are too high. They emphasize the fact that profits are larger in relation to investment than they were a few years ago. Other people think profits are low. They stress the fact that profits are not much larger in relation to sales than they have been historically. Both sides agree that in some individual cases profits have been too high, as in others they have been too low or non-existent.

But if we cut the total volume of profits drastically, we shall do so at our national peril.

There is no room for debate about that. For we shall choke off the crucially important job of building new plants and equipment for our industries. Squeeze hard enough, and America will go the way of Britain – down the long and painful skids of industrial decline. Widespread unemployment, especially among our industrial workers who produce new plants and equipment, will mark the dreary way. Here is a fact which the President, the Congress, the C.I.O., and all of us have a real reason to remember:

Almost two-thirds of all profits today are going to rebuild and improve plants and equipment.

More than $13 billion of this year's profits are being plowed back. They are going – as a large proportion of profits have always gone – to buy for workers better tools to work with, better surroundings in which to work. They are making possible better products, and more of them, for all of us.

The figures below show how companies have put more and more profit-dollars and a larger share of their profits to work in the business:

YEAR	PROFITS REINVESTED	% OF TOTAL PROFITS
1929	$2.6 billion	31%
1939	1.2 "	24%
1943	5.9 "	57%
1944	5.2 "	53%
1945	4.2 "	47%
1946	6.9 "	55%
1947	11.2 "	62%
1948 est.	13.0 "	65%

continued on next page

The record shows that each of us is the real beneficiary of this plowing back of profits.

Every American has benefited from these profits. Each dollar that business has put into its plants and equipment in the last thirty years has increased our yearly production by 35 cents.

This re-investment of profits has helped make possible a 75% increase in living standards since 1919.

It has helped increase wages from an average 48 cents an hour in 1919 to $1.36 today. Allowing for higher prices, that increase means that an hour's work today will buy twice as much as it did thirty years ago.

Why must business retain these billions of profits to improve its plants and equipment? Why must it plow back more and more? *The reason is that business already is caught in a tax squeeze.*

Federal taxes alone take at least thirty-eight of each one hundred dollars a company earns. Then, if the company pays out to its stockholders any part of what is left as dividends, the federal personal income taxes of the stockholders may take up to 77% of those dividends. Under these conditions, so few people are willing to invest in industry that the stock market is stagnant. Companies can not raise in that market the money they need for improvements.

The result: business must rely more and more on plowed-back profits to pay for new plants and equipment.

We know that everywhere in industry new and better ways of producing goods are standing ready for use. The previous editorial in this series mentioned some of them. We know, too, that depression and war put our industries far behind schedule – as much as $100 billion behind – in getting the new tools they should have had to keep themselves in first-class shape. McGraw-Hill is now completing a survey of industry that will measure these needs. The results will be published in this editorial series. We know already that in 1949 alone industry will need $18 billion or more for this purpose.

And all but a small fraction of that sum must come from profits.

Our prosperity, our strength as a nation, our hopes for better living depend on our continuing to generate and to plow back a large volume of profits.

For that reason we should not thoughtlessly follow these people who propose to pay for any and all new government activities by saying simply, "Soak the corporations." There is no need to follow them. There are other ways of obtaining necessary funds.

First and foremost should be economy within the government itself. If its citizens must pay still higher taxes, then surely government should exercise rigid self-restraint, cutting out all but the most essential activities and expenses.

After economy should come consideration of a broader federal tax base.

If these and other methods of raising money are inadequate and if taxes must take a bigger bite from business profits, two facts are clear. We should not adopt an "excess" profits tax with all of its complications and all of its corrupting effect on business. A moderate increase in the regular income tax on corporations is much less dangerous. *But even such an increase, if necessary, should be accompanied by special allowances for expansion and depreciation that will encourage companies to continue spending their earnings for new plant and equipment.* We all have a stake in that.

At this critical juncture in our history profits have a new and vastly more important role than they have ever had. In unprecedented degree they are the drive behind our present prosperity and the key to a better, stronger future.

Give profits the axe and the blow does not stop there.

It cuts into the employment, the prosperity and the strength of our nation.

Everyone of us has a stake in how the President and Congress handle taxes on profits – and now is the time to remind them of that stake.

President, McGraw-Hill Publishing Company, Inc.

FACTORY
MANAGEMENT AND MAINTENANCE
L. C. MORROW, EDITOR

BETTER MATERIALS HANDLING

for cutting costs and increasing productivity

HERE BEGINS A 47-PAGE DISCUSSION of materials handling. FACTORY devotes this much space to a single subject, in a single issue, because

Better materials handling offers industry its biggest opportunity to cut production costs and to increase productivity.

This is true because every plant is in the handling business. And a given plant may be spending as much as 40 per cent of payroll for something that adds nothing to the value of its products. Specific cases have shown up to more than 60 per cent of the labor cost in production going for handling.

A simple exercise in arithmetic shows what the possibilities are. Total wages in manufacturing in 1948 were somewhere around $35 billion. Let's be conservative and say that only 25 per cent went for handling. That's close to $9 billion. Again let's be conservative and say industry could cut its handling costs 25 per cent. Net result would be a saving to industry of more than $2 billion.

But that is not all. There are other ways in which industry benefits from increased use of materials handling equipment. Here are just a few:

Steady flow of production. Good handling, combined with good layout and work simplification, means that costly stop-and-go production is superseded by steady flow of parts and materials. This eliminates bottlenecks. It assures steady employment. It simplifies the job of planning production.

Shorter manufacturing cycles. Better handling keeps materials on the move. Often they are worked on as they move. With fewer stops come important reductions in elapsed time from receiving dock to shipping platform.

Smaller inventories. With better handling it takes less time to make the product. Which means lower in-process inventories. Also smaller banks ahead of operators. As well as smaller stocks of raw materials and purchased parts.

Quicker deliveries. The more accurate scheduling that goes with better handling makes it possible not only to keep, but often to beat, delivery promises. The customer who gets good deliveries comes back for more.

Better utilization of space. When it becomes necessary to step up production, good layout and good handling come to the rescue. Case after case can be cited where production has been increased 50 per cent—sometimes doubled—in the same area.

Better working conditions. Other things being equal, good workers select the plants where working conditions are good. Good handling contributes to good working conditions by minimizing fatigue. And the worker that is not tired turns out more work. Which means greater productivity—and lower costs. Also the plant that does a good handling job is a safer plant to work in. Often it's a cleaner plant.

Those are benefits that industry gets from better use of materials handling equipment. They are exemplified in the pages that follow. In those pages industry leaders in the field of handling tell "How Eleven Companies Are Cutting Handling Costs." They answer three basic questions:

1. How can a company figure what handling is costing it?

2. How can it figure what part of this cost can be saved?

3. How can it figure what handling equipment to buy?

Last of all (beginning on page 107), FACTORY describes how specific problems have been solved through the installation of specific pieces of materials handling equipment. Since most of these cases were selected from small plants and since most of the installations are not elaborate systems, here is evidence that good materials handling is not alone big-plant or big-system opportunity.

Yes, every plant—whatever its product, whatever its size—is in the handling business. Which means that better handling is a cost-cutting tool every plant can use.

How Eleven Companies Are

1 · Ford Motor Company

Not initial investment but cost per unit moved is basis of determining purchases of handling equipment. It's a new and challenging method of analysis

OPERATING EXPENSE SUMMARY

DEVELOPMENT REQUEST NO.

SUBJECT: Shipping-Pallet vs. Loose Carload
Foundry to assembly location. Part No. A ---

PROPOSED X

PRESENT

DESCRIPTION $ COST PER Pc. UNIT

EXPENSE MATERIAL:
Band Iron, pallet and separators deterioration .0336

MISCELLANEOUS EXPENSE:
Gas, Oil, and Maintenance on trucks .0018

SHIPPING COST:
Shipping cost--source to assembly location .0236

OTHER:
None

TOTAL $.0590 PER Pc. UNIT

$ _____ PER _____ UNIT-REDUCED TO $ .0590 PER Piece UNIT

VOLUME 450 pcs. PER DAY @ 250 DAYS PER YEAR = 112,500 Pcs. PER YEAR

112,500 Pcs. UNITS PER YEAR X $ .0590 PER UNIT = 6,637.50 PER YEAR

CALCULATION of costs is always made on a per unit basis at Ford. Except in rare cases of short-life equipment, prorated depreciation rather than original investment is considered before a change is made

Cutting Handling Costs

1. Cost Analysis

The approach to materials handling costs at Ford differs from the typical one of "How long will it take the installation or equipment to pay for itself?" Rather, Ford treats handling equipment as it does any other type of equipment when analyzing and comparing existing and proposed methods.

The ordinary standard of "how long it will take to pay for itself" did not give a true picture because it failed to take into account the basic difference between long-life and short-life equipment.

Here is an example of what is meant (the figures are for illustrative purposes only):

If a $40,000 installation produces a saving of $50,000 a year in handling cost it is sometimes said that the

MATERIAL HANDLING COST SUMMARIZATION

DEVELOPMENT REQUEST NO.

SUBJECT: Shipping-Pallet vs. Loose Carload Foundry to assembly location - Part No. A---

	PRESENT COST PER Pc. $	PROPOSED COST PER Pc. $
1. LABOR		
Remove from conveyor to car and dunnage	.1188	
Remove from conveyor and palletize		.0746
Haul pallets to car and load into car		.0060
Dunnage pallets in car		.0039
Unload at assembly location	.0572	.0042
2. OPERATING EXPENSE		
Band iron, pallet deterioration, gas, oil, and truck maintenance and switching cost.		.0590
Dunnage and shipping cost	.0296	.0008
3. DEPRECIABLE FACILITY & EQUIPMENT		
Depreciation on Fork and Tow truck		
4. OTHER:		
None		
TOTAL	$ .2056	$ .1485

POTENTIAL ~~LOSS~~ OR SAVING $ .0571 PER Piece

POTENTIAL ~~LOSS~~ OR SAVING $ 25.695 PER DAY @ 450 DAILY

POTENTIAL ~~LOSS~~ OR SAVING $ 6,423.75 PER Yr. @ 250 DAYS

COMPARISON of present and proposed methods is exhaustive, yet purposely avoids any attempt to evaluate savings in supervisory or organizational expense. Such fringe benefits are often only illusory

installation will "more than pay for itself in the first year." Now, if the investment was for short-life wood containers, the saving will be $10,000 in the first year *only if containers last that long.* Maybe they will last more than one year, maybe less.

To avoid the danger of such misleading statements of potential savings, Ford analyzes handling costs on a cost-per-unit basis, with the equipment investment spread over the normal life expectancy.

Returning to the example above, consider the picture if long-life metal containers had been purchased. Assume the cost of the installation now at $150,000. By old-style figuring, it would take three years to pay for itself, and on that basis such a proposal might well be rejected. But by Ford's method of computation, it might be found that a reasonable life for the metal containers is five years, and consequently the cost would be assumed to be $30,000 per year. The saving that would actually be realized, based on these computations, is assumed to be $20,000 a year for five years. If the containers last more than five years, there is a saving of $50,000 per year for the remainder of the life of the container.

It is true that in the example cited the "break even" period would be approximately three years, but this should not be a deterrent to any company looking for good sound investments. It should become a factor only when a lack of funds requires short-term cost return.

The materials handling cost analysis at Ford also recognizes operating and maintenance costs of power equipment. For example, current surveys show that local shuttling operations cost so much per hour. These figures usually include depreciation, fuel, water, grease, and preventive and overhaul maintenance of equipment, as well as operators' wages.

If, for instance, it is desired to know the relative costs of transferring material from one building to another by truck or conveyor, it is possible to compute the trucking cost at so much per hour times the number of hours required. Then, if the study works out to the advantage of trucks and the operation requires additional trucks, the purchase is based on a previously determined tooling and method issue rather than on a specific savings analysis.

Materials handling cost analysis is always complicated, especially when power equipment, building heat, lights, maintenance, operating, and labor costs have to be listed and correctly related to proposals. Existing installations can be costed comparatively easily. But proposals are necessarily based on estimates and therefore are likely to carry prejudiced or unprocessed costs. When prejudiced proposals result in new investments, they generally fail to produce the expected savings.

Another factor that complicates materials handling cost studies is that materials handling labor is a part of overhead expense. Thus handlers taken off the payroll reduce overhead by the amount of wages, but supervisory and handling organization expense is not reduced in proportion to the reduction in personnel. In fact, there is no saving whatever in such expense until personnel can be cut to the point where reassignment of supervisors or organizational consolidation is possible.

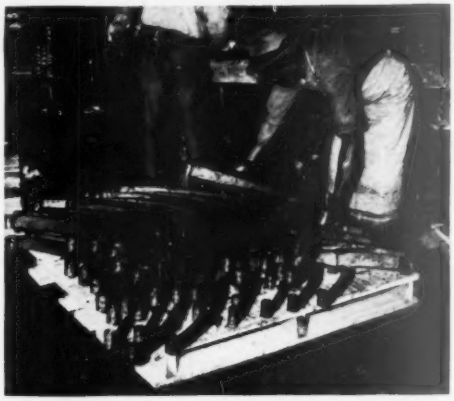
The materials handling analyst at Ford is provided with a set of five forms designed to bring to light every phase of cost in any analysis. These forms, based on fundamental handling operation requirements, are subject to review by accountants because they list details of operation and then build up to unit or daily costs. The five forms are as follows:

1. *Operation Analysis.* Here the complete routine or sequence of handling operations is listed. Each cycle of handling is assigned a time element. Then it is classified according to the type of labor used—hand labor, tow-tractor operation, fork truck operation, conveyor attendant, etc. From this analysis a total labor standard for any operation is established.

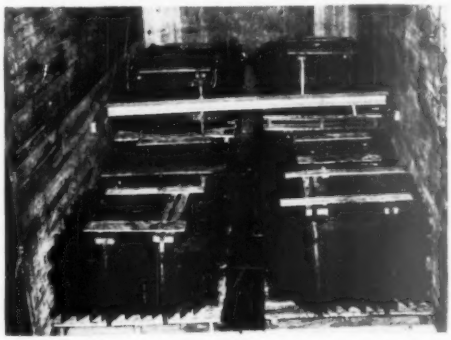
2. *Operating Expense Analysis.* On this form are recorded all items of expense required as a part of the operation—steel tape, nails, dunnage, gas, oil, maintenance, etc. From this analysis a cost per unit is established in detailed record form.

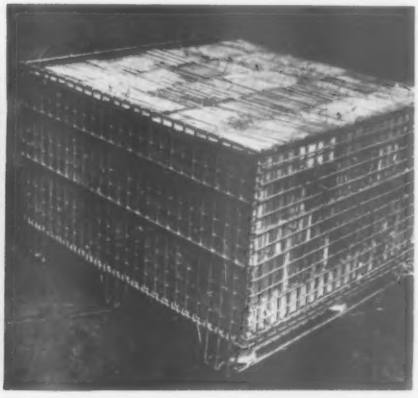
3. *Operating Expense Summary.* This sheet (see illustration) summarizes the details listed on the

TYPICAL IMPROVEMENTS



CHASSIS SPRINGS. Old way (not shown) involved individual handling of springs onto a conveyor and from end of conveyor to cars at loading dock. New way is to palletize (above) and move 168 springs at a time by fork truck into boxcar (below)





FIRE BRICK. Old way (above, left) was to store on pallets. Damage was a large item. Space was poorly utilized. New way (above, right) employs wire containers. Damage eliminated. Better use of space

INSTRUMENT PANELS were bundled (below, left) four in a package, loaded on trailer, moved to dock, loaded on truck. New way (below, right) eliminates bundling. Unit load is kept intact to point of use

second form. It is necessary to obtain a sub-total for quoting on the final summary form.

4. *Depreciable Facility and Equipment Analysis.* Recorded here is the direct depreciation chargeable to the particular operation in question. Included are such items as conveyors, power trucks, trailers, steel containers, etc. This amount is reduced to a cost per unit, as are the totals on all the previous forms.

5. *Material Handling Cost Summarization.* This sheet (see illustration) summarizes the costs per unit from the first four forms, listing the two methods as "present" and "proposed." The unit cost is then built up to savings or loss per day and per year.

These forms for recording the detail and summary provide a common method for check and review by accountants and eliminate the usual controversy between cost analysts and handling engineers. With all the facts listed they can be reviewed easily.

2. *Case Histories*

Several millions of dollars have been spent by the Ford Motor Company in the last few years to introduce modern handling equipment and facilities. The unit-load or container system, for instance, took a large share of this expenditure, and enormous strides in unit-load handling programs have resulted from the original investment. In several cases the potential savings were so large that they are worth mentioning. Some are the result of careful study, lengthy surveys, and detailed cost analysis; others are just a natural application of standard equipment.

The largest individual saving came from using fork trucks and self-dumping hoppers to dispose of foundry scrap. The new equipment replaced hand trucks, wheelbarrows, and trailer dumpcarts. This extremely costly operation was reviewed by a staff engineer. Sample equipment was tried out on the job. When it was evident that large savings were

MATERIAL HANDLING COSTING ANALYSIS

DEVELOPMENT REQUEST NO.

SUBJECT: Shipping in bin pallet proposed vs carton present

PART NAME: Bracket PART NO. HC--- VENDOR:

	VENDOR PRESENT	VENDOR PROPOSED	FORD PRESENT	FORD PROPOSED
Average freight cost for material			$.02313	$.02313
Average freight cost for container - loaded			.00087	.00137
Average freight cost for container - empty				.00110
Loading labor - container handling				
Unloading labor - container handling			.00079	.00041
Pallet depreciation and carton cost	$.00300	$.00093		
Equipment depreciation and operating Expense (Ford)			.00024	.00040
Other				
TOTAL	$.00300	$.00093	$.02503	$.02641
GAIN—BY PROPOSED		.00207		
LOSS—BY PROPOSED				.00069
MAXIMUM NET GAIN (If vendor passed along full saving realized)				.00138

COSTLIER METHODS are sometimes good business. Proposal analyzed would cost Ford more, in direct expense, but would save in long run if vendor agreed to pass along part of saving method would produce for him

possible, studies and cost analyses were completed, and new equipment was purchased as a result. In operation, this method is saving Ford many thousands of dollars a year.

Another outstanding example is the use of fork trucks and standard steel tub containers. Here the application is in the receiving, storing, and distribution of rough castings and forgings to points of use. This was a very extensive investment, including the paving of an outdoor storage area. Previously, handlers moved pieces from trucks into large wooden bins. When the pieces were needed in production, other handlers lifted them from the bins and placed them on conveyors. Now, by placing the container in the truck and filling at that point, all subsequent handling is performed by fork trucks, moving 2000-lb. to 4000-lb. lots. Net savings are substantial.

Another good example is the change in core handling in the foundry, where pushcarts have been replaced by special racks designed for fork truck moving and storage. This conversion to machine handling also was a big money saver.

The recital of accomplishments could go on and on. Add to them the normal uses of universal-type tubs and racks which provide substantial savings besides increasing the tonnage capacity of handling docks and areas.

Opportunities for standard containerization are reviewed by the handling organizations in the local plants with equipment allocated on a tooling basis. That is to say, savings alone are not as important as the integration of the containerization system with facility capacities, existing handling conveyors, and plant layout arrangements.

On this basis, two of the new Ford plants were originally tooled with an integrated handling arrangement covering conveyors, containers, and intra-plant trailer trains. In only one or two instances was it necessary to make a cost analysis to determine the type of facility.

This approach will become more general with new layouts and plant changeovers for new model production. In many cases, the results will be measured in greater production volume rather than in specific materials handling savings.

3. *Purchased Parts Packaging*

The Ford Motor Company program covering vendor packaging specifications takes into account handling costs, power truck operation and depreciation costs, and container depreciation.

Pallets and other unit-load containers must be accumulated for return, repair, and reloading. Thus there is considerable cost involved in addition to freight and container depreciation. With one-time containers there is the matter of disposal costs.

Except on local movements, few items can be eco-

nomically containerized into unit-loads for handling with fork trucks or other similar handling machines. This is so because the freight classification requires payment for pallets or containers at the same rate as the commodity contained, while bulkheading travels free. Certain items that use expensive wrapping or packing can be economically containerized if this wrapping can be eliminated. An analysis of extended hauls reveals that it is possible to handle loose at a receiving point and place into a container at the truck or railroad car spot. This practice affords all the advantages of containerized handling through storage and processing without the attendant costs of freight, accumulation for return, repair, and loading.

Ford has developed a method of specifying packaging to the purchasing department in such a manner that the loss and/or gain is detailed. Through these data the company knows when a costlier method on its part results in a saving to the vendor. This increased cost in many instances can be recovered by arranging with the vendor to pass along some of his savings through reduced purchase prices. (See illustration on page 70.)

The extent of palletization beyond the actual dollars-and-cents economy is being decided as a policy issue. The main reason for this approach is the tonnage-capacity increase of limited receiving facilities. Although new truck and rail docks are constantly being proposed and installed, there is no possible chance of a return to loose handling on a pure cost basis. With the increased number of models, production volume has grown within the plants and many additional parts have been introduced. The related materials handling problems have been solved through palletized or unit-load receipts.

Another reason for policy decision covering vendor unit loads is the resulting mixture of hand and machine labor on receiving docks. When incoming car truck shipments are not scheduled for a consistent distribution of handling labor, one labor classification or the other is overloaded. It is not practical to have additional power trucks available if, for example, Wednesday receipts of unit loads are three times the weekly average. The same holds true with loose material and hand labor. It is not practical to have additional hand-handlers available in case Thursday receipts are three times the weekly average.

4. Education and Training

In the transition from manual handling to machine handling, supervisors should be acquainted with handling-machine capacities, minimum container investments, controlled inventories, reconstructed docks, etc., in such a way that they can bring intelligent planning to handling operations. Ford is attempting to analyze the full impact of this transition.

The company feels that plant mangement needs a clear interpretation of the status of the new materials handling era in manufacturing. It also believes that materials handling engineers need more training in integrating various types of handling equipment and balancing such facilities to the scheduled and normal manufacturing program. Ford training plans also schedule aids for on-the-job supervisors. Foremen must become familiar with the *do's* and *don't's* of handling-machines and containers, the *can's* and *cannot's* of handling-machine and container allocations or capacities. They must know the general work arrangements necessary to keep freedom of movement when they are dealing with equipment that is easily blocked off from its area of operation.

A booklet entitled "Material Handling Standards" has been prepared and distributed to men in the plant operating group. This booklet is broken down into four sections:

1. Purposes and aims
2. Package handling discussion
3. Handling engineering—handling thinking
4. Materials handling standards—summary

The distribution of this text followed a meeting held for the purpose of bringing home to operating executives the necessity of accepting responsibility for materials handling costs. In other words, instead of letting "Joe Staff" do it, it should be done as a part of standard manufacturing practice.

Discussing handling standards, the text points out two basic needs:

1. To increase volume from present production facilities by a smooth flow of material to and from operation

2. To bring handling and storage operating costs under control and to lower the present excessive cost of operation

The text also points out the necessity of keeping an open mind in any consideration of materials handling problems. It says:

"There is too much to be gained from new ideas and methods to close our minds to the experiences and ideas in the field. The mechanical systems of package handling are progressing extremely fast, and we want to be sure to take advantage of the latest developments in machines and ideas."

In the outline of organizational requirements, the text reads:

"Progressive handling groups must be organized to (1) develop and use handling job analysis, (2) use the 'amount of work to be done' and the 'amount of equipment capacity' equations in actual floor performance, (3) carry on planning for a better job tomorrow in addition to successful accomplishment of today's problems, (4) apply flexible facilities and areas from one type of handling storage use to another."

Summarizing, the text points out:

"Progress in materials handling does not wait upon technical development as much as it does upon the development of organizations, on the applications of the best principles and practices of management, and on the open-minded point of view."

Another booklet, "Material Handling Standards as Applied in Ford Motor Operations," is used to help materials handling engineers with their analysis and method-selection problems. Brief text and pictures are used to point up engineering problems, leaving general discussions as a means of idea presentation. This manual cites four major goals for materials handling engineering:

1. Increase production capacity through the medium of comparatively smaller investments in mechanical handling equipment.

2. Reduce the cost of material flow and control through the medium of compact and centralized warehouse activities.

3. Reduce the cost of scrap and salvage repair

through the medium of handling in contained packages wherever possible.

4. Increase the capacity of existing handling facilities through the medium of education and knowledge of machine capacities, developed by changeover to machine handling.

Materials handling *engineering* is described as sound materials handling *thinking* carried to conclusions which are based on the complete processing of the operation. Emphasis is placed on the contribution handling engineers can make to employee morale by relieving some of the physical effort involved in materials handling.

Work-area arrangements and work-volume continuity are analyzed as two aids necessary to any method or facility selection. Arranging a layout to promote a continuous flow of work is the best guarantee of low-cost operations. When handling volume is spotty and requires moving from area to area, it is hard to have effective or efficient operations.

The text points out that material flow is a tangible item that can be directed and controlled to the benefit of any peculiar plant structure or container system. It is noted also that containers are filled and moved to operations and then returned empty for reuse. With universal-use containers, entire plant layouts can be arranged so that empty containers are refilled at adjacent operations and moved to subsequent operations. In this way the receiving and shipping areas can be side by side, with the empty container moving from the shipping area to the adjacent receiving area, rather than across the plant as most conventional layouts require.

A presentation for department superintendents is being prepared on the basis of handling costs. Each factor of the materials handling facility will be presented in the light of its cost. Discussions will deal with the necessary use, distribution, and scheduling of machines, areas, and labor if low-cost operations are to result.

The line foreman will also be given help with instructions and training material. Present plans are to base this text on a theme of "keeping handling employees busy at productive handling work."

Scheduling education and training to cover properly the transition from manual to machine handling must recognize the existing status of job knowledge, supervisory training, and modern facilities. Otherwise the subject matter will be over the heads of the people involved. Theories and principles of practice must be closely related to the day-in and day-out operational problem.

5. *Equipment Investment*

The Ford program for equipment selection is based on materials handling principles. These principles were not discovered in Ford operations, but have been proved in other industrial and warehousing activities.

Ford intends to profit by such experience.

The principle applied is: It is wasteful to spend time and money developing an idea on which much time and money have already been expended by someone else.

The Ford equipment program is based on these considerations:

1. Industrial power equipment. *Simplify maintenance and parts supply problems by using the fewest possible types.*

2. Container equipment. *Strive for universal and flexible applications with the fewest possible units.*

3. Conveyors. *Allow for re-use and economical change-over with types that are not too specialized in design or power drives.*

4. Industrial power trucks. *Base selection not on comparative first cost of equipment but on comparative cost per unit of material handled.*

The different types of power trucks on the market are well represented in Ford operations. The problem now is to reduce the extremes of various types in individual plants. Next it will be the reduction of extremes in area operations. This program will allow the continued purchase and use of various types without the cost of large and varied parts inventories at localized points. Preventive maintenance procedures have been issued, and local and area repair or overhaul shops are being installed. Maintenance employees are being trained for quality workmanship.

With container equipment, the principles of investment are:

1. *All equipment and methods should be designed, when possible, to permit economical operations under changing conditions.*

2. *Trailers are primarily transporting equipment, and are too costly for any but short storage periods.*

Container equipment has been standardized into three groups: (1) Pallets; (2) tubs or bin boxes; (3) steel racks.

A universal dolly or trailer is standard equipment for movement of any or all of these non-wheeled containers. Eight special highway trailers are in use in the Detroit area for shuttling containers between plants. By a special arrangement of gravity rollers in the van type trailers, any of the above containers can be rolled into the trailer from special dock stations. Also any load in the trailer can be discharged by gravity flow to an adjacent dock station. Highway equipment is kept on the move by this arrangement, and fork trucks do not have to service highway equipment when it arrives at receiving or shipping docks.

The real issue in tooling the job with universal-use containers is in allotting enough but not an oversupply. The evil of a surplus lies in the opportunities for misuse. Once containers are used as a convenience for non-scheduled purposes, such practices expand quickly until the necessary supply for transporting scheduled items is depleted. The result is extremes of cost and production losses.

Here is a good place to point out that no container system should require a continuous supply of empty containers. In a well planned and executed system, the empty container is moved from one operation to another. There are never quite enough containers to go around when scheduled high points are reached. This is a healthy condition which eliminates partly filled or wrongly used containers by forcing them into circulation on scheduled transportation.

In general, the Ford staff feels that investments made in recognition of basic principles and kept within a practical minimum supply can be expected to return a substantially lower cost in materials handling operations.

2 · Zenith Radio Corporation

B. E. GLENZER
CHIEF PRODUCTION ENGINEER

Handling costs are down 25 per cent. Trucking survey illustrates Zenith's basic approach to problem. Typical improvements show how savings are made

1. Five steps to lower materials handling costs

A full-scale attack has been launched within the past year at Zenith to improve handling operations and reduce handling costs. Over a period of six months over-all handling costs were reduced by more than 25 per cent.

First management organized a production engineering division and gave it full authority. Its prime responsibility was (1) to improve manufacturing methods to reduce product costs, and (2) to simplify handling methods to minimize non-productive costs.

This division equipped itself with men specialized in methods, work simplification, flow and process analysis, materials handling, and other related activities. Zenith now is equipped with the organization, men, and tools to do the improvement job.

A five-step analysis of materials handling operations has been developed, as follows:

1. All handling operations are subjected to closer visual observation in order to reduce cost.

2. Flow and process are analyzed to determine the proper type of container, its movement, the device or equipment used to make the move, and the distance of transport.

3. All possible improvements are discussed in conference with methods, layout, production, materials handling, and maintenance engineers—and, in many cases, with top management.

4. If the suggested improvement is approved by a majority in the conference, a test installation is made, and the method is given a trial. The result of the trial run is then discussed in conference before the actual approved installation is made.

5. The new method is set up with improvements determined from the test run.

Zenith management is convinced that without this painstaking approach its plantwide attack on handling costs could not have succeeded.

2. How trucking costs were cut 20 per cent

One of the first major undertakings of the production engineering organization was a plantwide trucking cost survey. The objective was to eliminate the confusion and congestion caused by greatly expanded production. Materials handling costs were climbing out of sight. Something had to be done quickly. The basic idea was to determine what was happening between receiving, stores, production, and shipping. The following approach was developed and used:

1. Ratio of materials handling labor hours to total productive hours was determined. Data were broken down by activity, department, and month.

2. Actual number of employees engaged in materials handling and their position on the organization chart were determined. A chart was developed to show the line of authority for the various activities.

3. Equipment and devices now being used for materials handling were tabulated by type, quantity, department, and use.

4. Other industries were surveyed to determine what methods and equipment were being used to solve similar problems.

5. Materials handling equipment manufacturers were consulted as to advantages and limitations of their equipment.

6. Master flow charts of the present routing of material were constructed. Observers were assigned to this job and given the responsibility of following all truckers and other handlers for adequate periods of time to determine the actual condition existing.

7. Recommendations were made regarding improved plant layout, routing of material, and proper equipment, including flooring materials that would hold up best under heavy traffic.

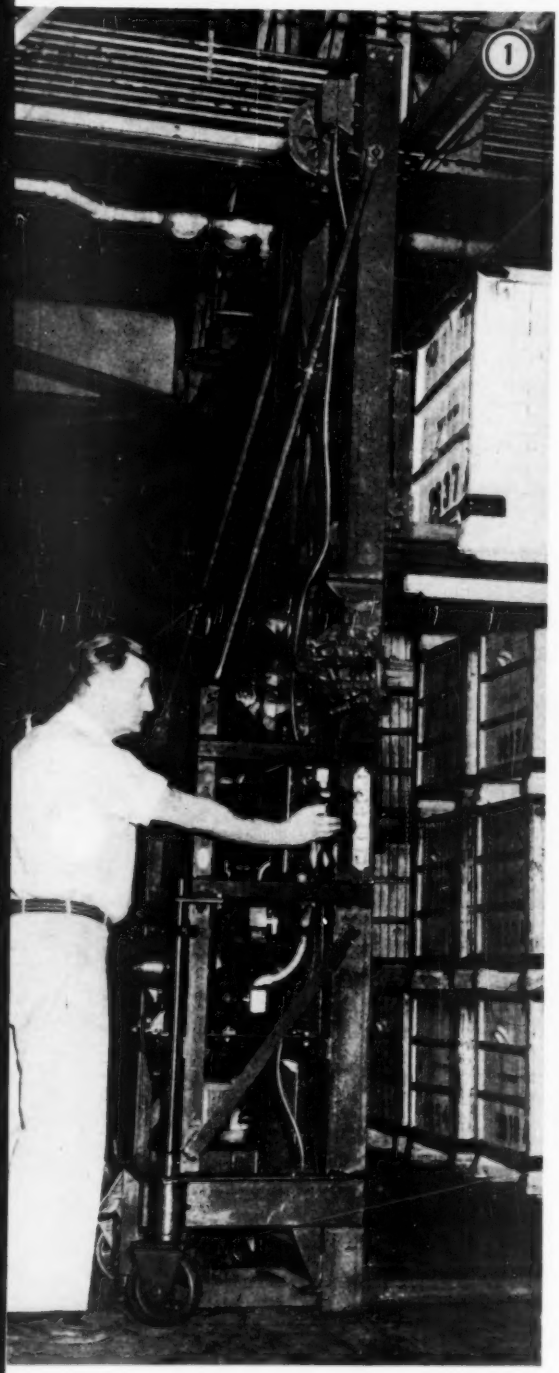
8. Additional studies necessary for careful analysis of other phases of the problem were made.

9. Both the safety and fatigue of operators who handle materials were considered.

10. Present use of account numbers in charging time was studied, and recommendations were made for changes where desirable. For instance, it was found that set-up men working in the welding department, who also did trucking, charged all their time to set-up.

This procedure is typical of the analysis of materials handling operations at Zenith. As a result plantwide trucking cost was reduced approximately 20 per cent. These savings were realized through reduction of transporting distance, equipment depreciation, savings in materials handling personnel, and improved production material location.

To illustrate the effectiveness of this thorough and careful materials handling analysis, typical improvements are shown on the two following pages.



1. AIR RIGHTS. With increased production, many of the aisleways became cluttered with material, departments were choked with containers, and operations in general were considerably slowed down. The answer was to make use of "air rights." The new storage system sets aside special areas where stacking boxes can be stored four high. Portable elevators are located at these areas and can quickly pile or remove the stacking boxes. Power trucks move materials from and to these storage areas. This system alone has saved approximately 50,000 square feet of valuable factory floor area and has minimized damage to products.

2. POWER TRUCKS. Hand trucks were used to transport loads throughout the plant regardless of weight or distance. Three men were often required to push a heavy load from receiving to stores, a distance of 1253 feet, requiring 25 minutes. Thus it took 1¼ man-hours to move a single load. Now one man with a power truck moves the same load in 10 minutes and most of the time comes back with a pay load. Photograph shows both old and new methods.

3. STACK BINS. Materials received in cartons, kegs, and boxes were delivered to stockrooms and then to production departments in the same containers. Because of many different container sizes, the racks in the stockroom and production departments were being utilized to only 50 per cent of capacity. Workplaces were crowded with unsuitable containers and

4. SPECIAL TRUCK. A delicate tuning unit was formerly received from a subcontractor in pasteboard cartons. There were 40 units in each carton, each surrounded by several cardboard partitions, that had to be unpacked individually at assembly points. Special handling trucks were designed to fit sideways in highway trailer trucks. Slotted partitions at a fifteen-degree angle eliminate the necessity

debris. Housekeeping was a problem. Parts were often mixed by stacking one box inside of another. And counts were inaccurate. Materials now received in the stockroom are first identified, counted, and then transferred to self-stacking bins. These bins are placed in specially designed racks, making the maximum use of the floor space allocated. When a bin of material is delivered to the assembly department, the empty bin is returned to the stockroom. Handling is thus reduced to a minimum; housekeeping is improved; mixed parts and inaccurate counts are completely eliminated.

of any locking device. Six times as many units (240) can be shipped in a truck. There is no unpacking at assembly point. Loading and unloading times have been minimized. And handling costs have been reduced better than 50 per cent.

5. BELT CONVEYOR. The radio chassis final assembly line, more than 200 feet long, is manned by 70 operators (each performing a small part of the assembly operation and then pushing the chassis on to the next operator). Power belt conveyors were installed on these lines to insure steady flow of materials and reduce operator fatigue. This improvement resulted in a reduction in handling costs and an improvement in production efficiency of approximately 25 per cent.

3 · THE B. F. GOODRICH COMPANY

W. W. SCULL
GENERAL MANAGER, MANUFACTURING SERVICES

There is a wage incentive standard for every move in this plant with its more than 50 multi-storied buildings. The result is flexible, low-cost handling

Efficient movement of materials has for many years been one of the important objectives of our company's management. The transportation problems of our principal Akron plants are those peculiar to multi-level factories with limited elevator and floor-loading capacities.

The limiting physical characteristics of our building layouts, and the immense variety and volume of materials that must be handled, have convinced management that the handling system must be sufficiently flexible for adaptation not only to current conditions but also to future changes.

The start of our Akron factory transportation system was in 1917, when the company purchased its first electric low-lift truck. Since then, with increasing emphasis laid on the speedy transport of materials at the lowest possible cost, the system has been expanded until today we have 100 industrial trucks of various types, 25,000 skid boards, 8000 pallets, and 600 trailers, in addition to numerous other pieces of miscellaneous equipment.

A separate department has been set up with more than 250 employees who are exclusively engaged in transporting intra-plant materials and finished products within the plant. This transportation department does not have jurisdiction over the relatively smaller handling within departments. Such handling is the direct responsibility of the production department superintendents. The complex nature of the transportation department's problem may be better realized, perhaps, when it is understood that in manufacturing in our Akron plants we utilize a total of more than 10,000 separate materials which run the scale from bales of rubber weighing up to 225 pounds to small quantities of pigments and fillers used in manufacturing many rubber products.

Actual costs of moving the materials needed for the daily output of more than 50 multi-storied buildings, in which approximately 11,000 production workers are today engaged, have been under keen scrutiny ever since the factory transportation system was first established 31 years ago.

Trucking Incentive System

Our company figures internal transportation costs by adding the costs of the movement of raw materials from processing operations to production departments, and of finished products from production departments to shipping rooms. Each cost is separately added, and the total is then weighed against the total poundage of finished goods of each of the three principal manufacturing divisions—tires, industrial rubber products, and aeronautical products.

For more than 20 years industrial trucking as performed in the Akron plants has been paid for on wage incentives based on round-trip operation. Since centralized trucking operations are rarely conducted on a full-load outgoing and empty return basis, certain inequities developed in the wages earned by truck operators. Early last year it was determined that incentive standards should be re-established with wage payment on a "loaded-trip" basis. This simply meant that truckers would be paid for delivering a full load of material from one department to another, but would not be reimbursed for the empty return trip. Obviously, steps had to be taken to insure the maximum utilization of return loads; otherwise the established standard cost per loaded trip would have equaled the former round-trip standard, and nothing would have been gained.

To insure loaded operation for a maximum period, it was necessary to design and install a central dispatching system. Routes of travel were carefully

INDUSTRIAL PRODUCTS DIVISION
LIFT TYPE ONLY DELIVERY TICKET
GOOD FOR ONE LOAD ONLY

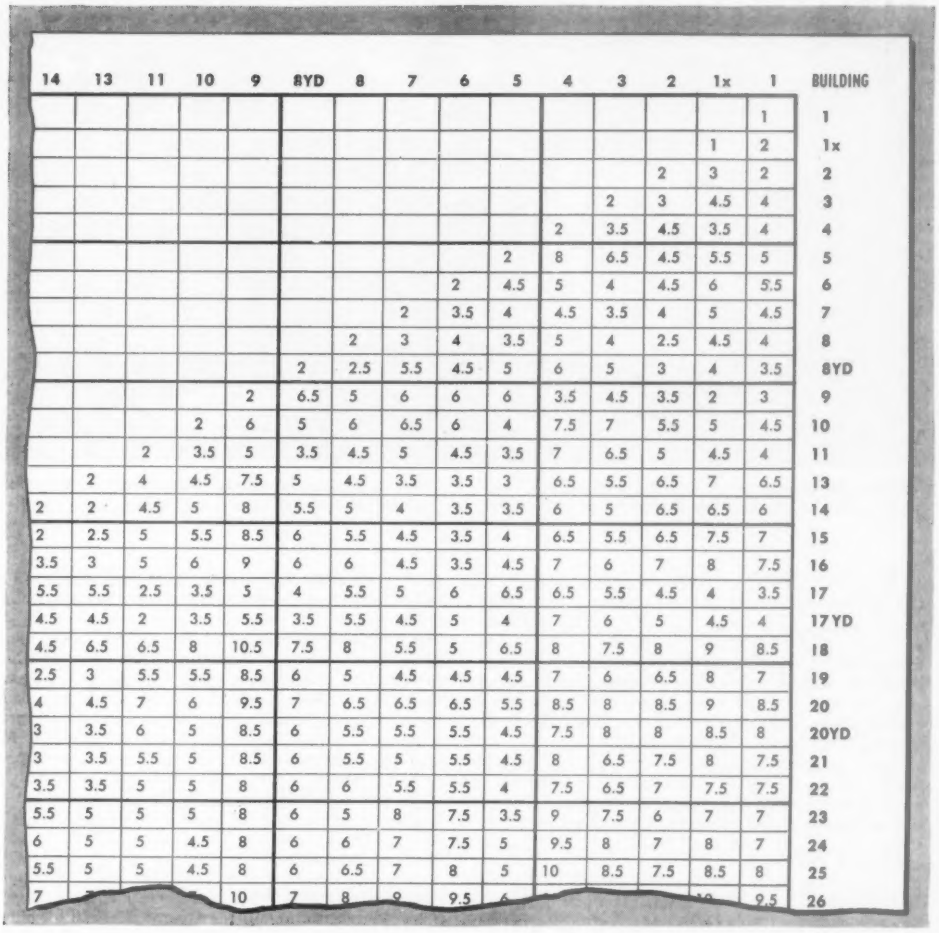
DATE	10-20	TIME	1 35	AM PM
CHARGE TO FROM DEPT.	7615	BLDG.	20	FL. E
TO DEPT.	2540	BLDG.	8	FL. A

SHIFT	ELEVATORS	P. R. NO.	TRACT. NO.
3	81	1010	251

RELAY MAN'S SIG.	P. R. NO.	BLDG.

MATERIAL AUTOMOTIVE
782108 WEIGHT 1750
R. W. Gordon
AUTHORIZED SIGNATURE

MOVE TICKET gives payroll department data needed to figure work units earned per trip



14	13	11	10	9	8YD	8	7	6	5	4	3	2	1x	1	BUILDING
														1	1
													1	2	1x
												2	3	2	2
											2	3	4.5	4	3
										2	3.5	4.5	3.5	4	4
									2	8	6.5	4.5	5.5	5	5
								2	4.5	5	4	4.5	6	5.5	6
							2	3.5	4	4.5	3.5	4	5	4.5	7
						2	3	4	3.5	5	4	2.5	4.5	4	8
					2	2.5	5.5	4.5	5	6	5	3	4	3.5	8YD
				2	6.5	5	6	6	6	3.5	4.5	3.5	2	3	9
			2	6	5	6	6.5	6	4	7.5	7	5.5	5	4.5	10
		2	3.5	5	3.5	4.5	5	4.5	3.5	7	6.5	5	4.5	4	11
	2	4	4.5	7.5	5	4.5	3.5	3.5	3	6.5	5.5	6.5	7	6.5	13
2	2	4.5	5	8	5.5	5	4	3.5	3.5	6	5	6.5	6.5	6	14
2	2.5	5	5.5	8.5	6	5.5	4.5	3.5	4	6.5	5.5	6.5	7.5	7	15
3.5	3	5	6	9	6	6	4.5	3.5	4.5	7	6	7	8	7.5	16
5.5	5.5	2.5	3.5	5	4	5.5	5	6	6.5	6.5	5.5	4.5	4	3.5	17
4.5	4.5	2	3.5	5.5	3.5	5.5	4.5	5	4	7	6	5	4.5	4	17YD
4.5	6.5	6.5	8	10.5	7.5	8	5.5	5	6.5	8	7.5	8	9	8.5	18
2.5	3	5.5	5.5	8.5	6	5	4.5	4.5	4.5	7	6	6.5	8	7	19
4	4.5	7	6	9.5	7	6.5	6.5	6.5	5.5	8.5	8	8.5	9	8.5	20
3	3.5	6	5	8.5	6	5.5	5.5	5.5	4.5	7.5	8	8	8.5	8	20YD
3	3.5	5.5	5	8.5	6	5.5	5	5.5	4.5	8	6.5	7.5	8	7.5	21
3.5	3.5	5	5	8	6	6	5.5	5.5	4	7.5	6.5	7	7.5	7.5	22
5.5	5	5	5	8	6	5	8	7.5	3.5	9	7.5	6	7	7	23
6	5	5	4.5	8	6	6	7	7.5	5	9.5	8	7	8	7	24
5.5	5	5	4.5	8	6	6.5	7	8	5	10	8.5	7.5	8.5	8	25
7				10	7	8	9	9.5	6					9.5	26

TIME STANDARD CHART resembles familiar mileage chart found on back of automobile road maps; is based on maximum truck speed; shows work units earned for every move inside the plant

studied. The three most frequently passed points were selected for the installation of dispatching stations. At a central point, dispatching operators receive telephone requests from the various departments for trucking service. These requests are relayed by telautograph to one of the three field dispatching stations, and there transmitted to the first available truck operator.

The basic material movement plan consists of two separate but coordinated parts: (1) A simple written order system for material movements; (2) time standard charts covering all possible trucking moves from department to department.

The order system utilizes small printed pads of orders (see illustration on facing page) on which the name of each specific division appears, transportation costs being charged to the division that requests the movement of the material.

Forms are in interleaved carbon sets of three consisting of a white original with yellow and pink copies. The white original stays in the issuing department as proof that an order was written. The pink and yellow copies go with the load. When a trucker is dispatched to deliver a load, he lifts the pink copy and enters on it his payroll number and tractor number. He turns in this copy to the timekeeping department at the end of the day.

The time standard charts (see exhibit directly above) list standard work units earned by the operator for each move. Every possible move (i.e., from every building to every other building) has a standard. In addition, a standard of 2.5 work units has been established for each time that the operator must use an elevator during a move. A value of 1.0 work unit has been established for each move between locations within a specific department. And

CONSTANT PROGRAM of repair, maintenance, and modification of equipment is carried on in transportation department's shops. Equipment is frequently redesigned to meet special purposes . . .

a value of 2.5 work units has been established for the delivery of empty skids. Standards are based on truck operating speeds, and charts have been developed to cover the various speeds made by the trucks. When a new truck is purchased and properly broken in, a speed test is conducted, and the standard chart to be used in determining the work units earned during the operation of the particular truck is determined by its maximum speed.

The wage incentive plan also provides the operator with an easy method of calculating his daily earnings. For example, on the delivery ticket shown, the operator has been requested to deliver an order from building 20, floor E, to building 8, floor A. By consulting the standards chart (which for tractor No. 251 is the chart on the preceding page), the operator determines that the following work units will be earned:

Movement from building 20 to 8..	6.5 work units
Movement on elevator.....	2.5
Total.....	9. work units

In the case in point, the operator multiplies the total work units by a conversion factor known as the "work unit value" (for example, $0.02) and arrives at a value for the delivered load of $0.18. His total compensation for the day, therefore, is merely the sum of all the individual figures for the total moves he has made.

The index developed by the application of these standards to the performance of an average truck operator, working at a normal pace, under wage incentive conditions, is approximately 80 units per hour, or 480 units per 6-hour shift. This is in comparison with 40 to 50 units per hour on non-incentive hourly rated performance.

Actual operation of trucks by experienced operators under the control of the central dispatching system and the application of these standards are at the present time developing indexes in the range of 85 to 90 units per hour, or 510 to 540 work units per 6-hour shift.

An interesting feature of the system is our handling of the empty skid problem. Since loaded skids are usually transported from receiving to successive production or processing departments and back to the shipping department, this cycle normally provides each department with enough empty skids for its daily requirements. If a department is not operating to capacity or is temporarily "down," sufficient skids are withdrawn from circulation to compensate for the situation, and the normal flow of skids in the system quickly adjusts itself to a proper balance between departments.

Occasionally, however, rush orders require more than the normal number of skids in a specific department, or a falling-off of operations causes more empty skids to accumulate than is consistent with requirement. In this case, the transportation department simply issues an empty skid ticket covering the number of skids to be delivered to or removed from the department. As previously stated, the trucker accumulates 1.0 work unit for each loaded trip that is required to complete the order.

The revised transportation system has resulted in yearly savings of more than $25,000.

Uncovering Potential Savings

Many factors, other than the actual transportation itself, contain elements that offer potential savings. Some of these are within the control of the department head.

As previously stated, handling costs are charged directly to the department shipping the material. If a department head suspects that his costs of shipping a particular product to a particular location are excessive (a fact he can verify by calculating total dollar value of move tickets issued), several avenues of investigation are open to him.

POWER TRUCK has been fitted with a scoop so it can be used in handling calender rolls . . .

NEW SKID PLATFORM was designed to treble load of tire tube stock. It holds 1350 pounds

In the first place, changes in the location of stockrooms or re-layout of production lines may accomplish a reduction in the distance between the shipping point within his department and the destination.

Second, investigation may uncover possibilities of reducing the distance to be traveled by the installation of bridges, or ramps, at a point between his department and the material destination.

Third, by studying skid-load sizes, it may be found possible to ship the same quantity of material in fewer total loads. The method of loading may be changed. Special skids that will hold more material may be designed. Or the shipment may be palletized.

How We Select Equipment

The suitability of the equipment in use is continually under the scrutiny of the transportation department. It has generally been determined that equipment speed, because of building limitations, must be limited for safe operation to 5.5 miles per hour. However, some of our equipment still does not operate at this speed; hence the department is constantly investigating the possibility of modifying the equipment itself (either through redesign of drive mechanisms or substitution of improved power sources), or of procuring faster trucks of improved design. The full-load capacity of the equipment is also included in the department's considerations.

When it has finally been determined that certain equipment must be replaced, several factors other than operating characteristics must be considered:

1. Maximum weight of the equipment plus the maximum and average loads that it will be required to handle. These facts are important, particularly in multi-story operation because the maximum safe floor and elevator loads may well be limiting factors.

2. Length, width, and maximum lift height (in the case of fork lift trucks, for example) of the equipment. These facts are important because elevator sizes, aisle widths, and potential storage heights (particularly in receiving, shipping, and warehousing operations) may be determining factors.

3. Actual physical distance over which the equipment will operate and the locations it will serve may limit the speed of equipment that can be used.

4. Type of material to be handled and volume that must be handled in a given period of time must also be studied. Where loads are likely to be light and intermittent, the need for a certain capacity truck may be indicated. Where loads are of both substantial weight and physical volume, and where total quantity shipped per unit time is large, the purchase of tractor and trailer equipment may be a necessity.

Following a complete study of a particular situation, the facts determined must be presented for authorization to purchase the equipment.

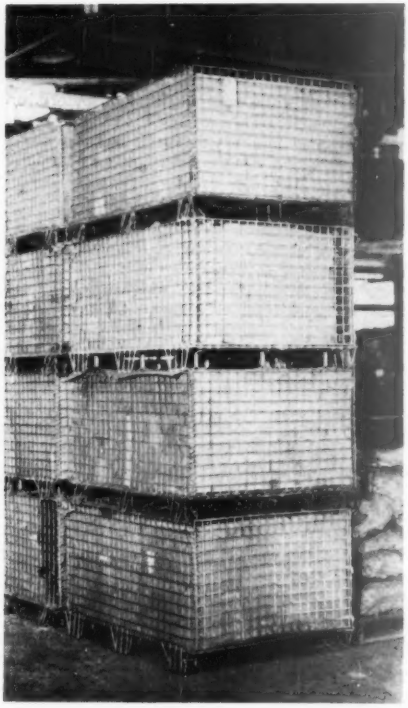
On the form used (not shown) the following points are covered: (1) What is to be purchased and the cost involved; (2) purpose of the proposal; (3) why it is necessary to replace the present equipment; (4) why it is necessary to purchase this specific type of equipment; (5) why it is necessary to purchase the equipment at this time. Additional substantiating data, with anticipated savings, are typed on the reverse side of the form.

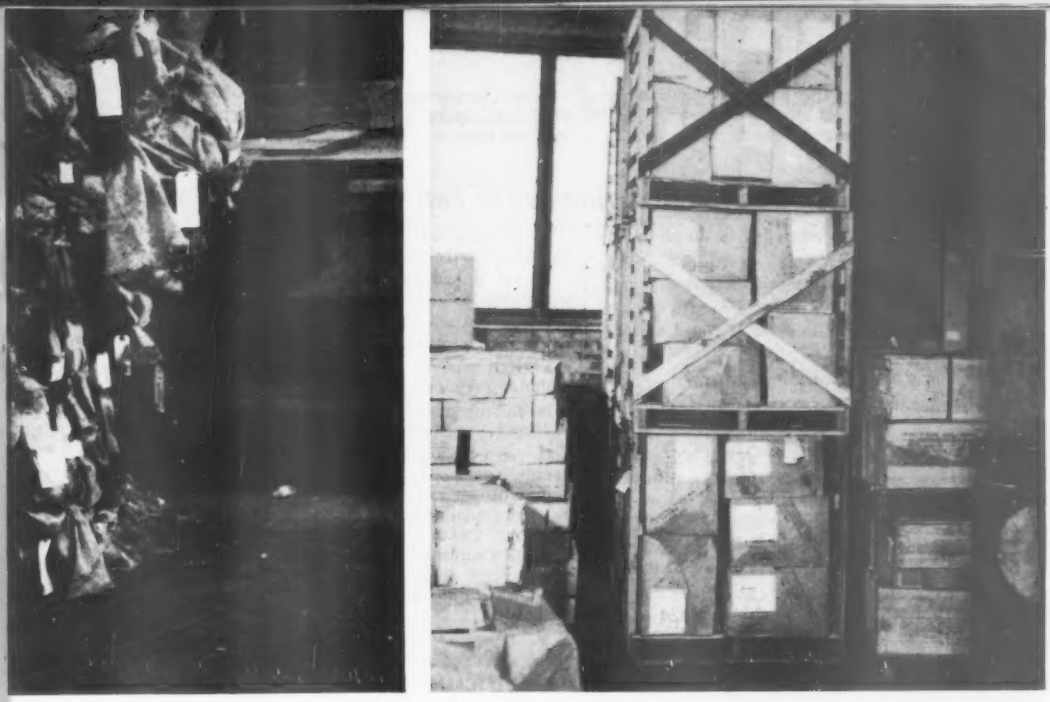
The job of the transportation department, with regard to the particular equipment involved, does not cease with the authorization and purchase of the equipment. After the equipment has been put in operation, and after a sufficient period of time has elapsed to allow an analysis to be made, management requires that a report be prepared showing actual savings compared with the original expectations. This means that original proposals receive far closer scrutiny prior to submission than might otherwise be the case. The record shows, however, that actual savings often exceed original estimates.

OLD WAY. Washing machine hose was delivered in burlap bags. Bags were hard to handle. It took two men with a four-wheel truck 16 man-hours to unload a car and transport the bags to the warehouse

OLD WAY (above). Handling small parts in all sorts of containers posed a real warehousing problem. It was impossible to make full use of storage area

NEW WAY (right). Small parts are received in collapsible wire-mesh basket pallets. Can now be moved directly to storage by fork truck. Results: A 50 per cent reduction in handling costs; 85 per cent increase in storage capacity





NEW WAY (photograph at right). Hose comes in cartons. Takes 8 man-hours to palletize and move to warehouse. Handling time has been halved. Three times as much material can be stored in same space

4 · INGERSOLL STEEL & DISC DIV. BORG-WARNER CORPORATION

R. C. BRADY
SUPERVISOR OF INDUSTRIAL ENGINEERING

Three fundamental questions answered. Fifteen ways to materials handling economies cited. Factors to be considered when selecting new equipment

1. How can a company figure its handling costs?

Until recently our accounting department was not set up to give a cost for any particular job of materials handling. Our old procedure was as follows:

1. Account numbers were set up for (a) materials handling equipment, and (b) materials handling payroll.

2. Each type of labor had a coded classification.

3. Account number, coded classification, and department number were put on the time cards.

This method could tell us how much money was being spent for handling labor and equipment for a given department, but did not give a breakdown product-wise or for a specific handling job.

For a complete breakdown, the job has to be analyzed and time-studied to find the cost of handling.

The accounting department, therefore, has been reorganized to use tabulating equipment. Through its use we now have our cost reports in two categories: (1) operating costs, and (2) labor costs.

Labor costs are compiled by distributing the actual payroll cost to the department charged.

The operating cost statement segregates the materials handling cost, which is the distributed portion

of the cost of operating the handling department.

The distribution of cost is by tons of material handled and produced in the departments. We arrive at a total materials handling cost on a departmental and product basis by adding the totals from the labor cost and operating cost statements.

2. How can a company determine what can be saved?

Materials handling economies can be made in at least fifteen different ways:

1. Replace manpower with mechanical equipment; use this manpower on productive work.

2. Move all materials a minimum of distance from operation to operation.

3. Lay out processes for continuous flow.

4. Lay out definite routes of travel for equipment and materials.

5. Coordinate handling equipment where possible.

6. Train personnel in proper methods of using equipment to its best effectiveness.

7. Eliminate unnecessary rehandling.

8. Place in-process materials in standard containers for better inventory control and ease of handling.

9. Make all containers stackable, if possible, to conserve floor space.

10. Install standardized equipment; resort to special equipment only when required.

11. Set up an effective plan for maintenance of equipment and control costs of labor and parts.

12. Supply and assign properly sufficient equipment to prevent production delays.

13. Help reduce demurrage by having vendors palletize materials.

14. Set up an accurate procedure for billing and crediting returnable containers, pallets, tote boxes.

15. Set up plans for a through restudy of materials handling methods. Check to see if: (1) Equipment is used properly; (2) new equipment is required; (3) new methods might be instituted; (4) handling is coordinated with production; (5) capacities of equipment are sufficient for the service.

The chief goals are to eliminate handling where possible and to reduce manpower through mechanical aids.

3. How can a company decide what equipment to buy?

There are several factors to be considered before any type of materials handling equipment can be recommended for a specific job:

A. *Operating methods and plant facilities*

1. Is operation to be permanent or temporary?

2. Do the sequence of operations and general plant layout produce an efficient handling system?

3. What are the building characteristics? (a) What floor load capacity? (b) Smooth or rough floor? (c) What size doorways, aisles, or passageways? (d) What degree of incline on ramps, if any? (e) Elevators' size and capacity?

B. *Materials or parts to be handled*

1. Bulk or units.
2. Bagged, cartons, boxes, drums.
3. Large or small.
4. Light, medium, heavy.
5. Shape.
6. Rough or fragile.
7. Quantities handled.
8. Continuous or intermittent flow.
9. Distance to be transported.

With these factors taken into consideration, we have some idea of the equipment requirements. We consider equipment factors in importance as follows:

1. Kind or kinds of equipment suitable for the job. Can we use a standard truck as built by a manufacturer? If the answer is yes, this means a lower initial cost on equipment. We try to stay away from any specially built equipment and standardize whenever possible.

2. Capacity of equipment. Will it do the job?

3. Hours to be in service daily and durability. Is it rugged enough to take the maximum amount of service required?

4. Size of equipment and space required for operation. This covers aisles, doorways, floor-load capacity, smooth or rough floors.

5. Flexibility and adaptability. Is equipment flexible as to type of loads? If the operation it is bought for were canceled, would it be adaptable to other services?

6. Power requirements. Gas, electric.

7. Ease and speed of operation.

8. Relationship to other handling equipment in service or contemplated.

C. *Dollars and cents measure*

1. Initial cost.

2. Cost of maintenance and operation.

3. Rate of depreciation and obsolescence.

4. Cost of labor to operate.

5. Taxes, insurance, interest, license fees, etc.

6. Direct labor, labor burden, increased production, fixed charges brought in by savings equipment.

In the final selection of materials handling equipment itself, there are certain fundamental considerations such as:

1. Equipment design, strength, rigidity, capacity.

2. Operating methods—heavy, medium, or light loads; normal or abnormal conditions.

3. Ease of adjustment and repair; provisions for addition and later changes.

4. Power required—gas, electric, steam, air, or hydraulic.

5. Control devices—electronic, automatic, and safety stops.

6. Standardization—interchangeability of units to reduce spare parts inventory.

5 · General Motors Corp.

J. H. LAMB
CHAIRMAN, MATERIALS HANDLING SUPERVISORY COMMITTEE

Time standards and long-term goals for materials handling insure measured progress toward lower costs. Corporation-wide committees coordinate

1. How can a company figure its handling costs?

Nearly all industrial bookkeeping systems include a method of recording non-productive labor separately from productive labor. They also divide non-productive labor into categories such as maintenance, inspection, materials handling, etc., by use of identifying account numbers.

A part of the description of General Motors' materials handling account reads, "Charge this account with all salaries and wages paid for moving materials, supplies, and product from one spot to another—without enhancing the value or performing any productive operations—from the time materials, supplies, etc., are received and stored up to and including the time finished article leaves the jurisdiction of the manufacturing management."

It is a fairly simple matter, therefore, to determine recorded materials handling labor costs. At General Motors, materials handling labor, identified as such, is periodically compared with productive labor on a percentage basis. So far this year our materials handling labor costs have improved a little more than 6 per cent over the calendar year of 1947.

The cost of handling material by employees who do not fall within the materials handling category is not included in this comparison. Nearly every employee in our plants has to handle material in order to do his particular job. Mechanical aids assist in reducing these handling costs, but they are still figured, in most cases, as productive labor expense.

Establishment in the past of time standards on productive operations has resulted in continued concentration on motion study, with the result that handling operations performed by productive operators have, in general, been thoroughly analyzed. The problem facing us, if we expect to reduce our identifiable materials handling costs, is to extend this study to the field of non-productive operations.

Establishment of materials handling time standards provides an opportunity for the same concentrated efforts towards improvement that have been made over the last 50 years on productive jobs. Each improvement can actually be measured. Daily performance can be calculated. This method is already accepted by top-level executives as an accurate measuring stick. It is a step toward improvement in the manner of recording materials handling costs.

2. How can a company figure what part of this cost can be saved?

The savings from improvement in materials handling methods and equipment are, of course, partially dependent upon the position in which each company finds itself relative to progress already made. As could be expected, the over-all improvement in identifiable materials handling costs in General Motors divisions between 1947 and 1948 was not uniform by plants. Nor did facts bear out the natural assumption that the most improvement would be shown by the divisions that had just become seriously interested in making materials handling improvement studies.

Apparently, the best approach to the problem is to encourage all affected supervisors to contribute. The more supervisors on the job appreciate the possibilities and results of materials handling improvements, the more complete the job analysis will be.

The amount that can be saved by one company as compared with another varies just as much as the amount that can be saved on each job. However, it is important to establish an objective. So, without any concrete facts, and entirely as a matter of opinion, it seems that in a plant where a serious study of possibilities has just been started, savings could be expected on a gradually increasing scale, starting at 1 per cent annually. Reductions could be expected to reach as much as 10 per cent for the first few years and then gradually decrease to a minimum over the years following.

We shall never reach a point where studies can be dropped or discontinued. Savings will always be possible if we are constantly on the alert for improvements in handling methods and equipment.

3. How can the company decide what equipment to buy?

Although General Motors divisions operate on an autonomous basis, it was decided in the fall of 1947 to establish a General Motors materials handling committee which would approach analysis and solution of materials handling problems on a corporation-wide basis.

The materials handling committee is made up of a main group composed of the materials handling

directors from each division; a supervisory group composed of chairmen of the various subcommittees; and subcommittees composed of technicians, specialists, and men with considerable experience in particular phases of materials handling.

Meetings of our main materials handling committee are held three times a year. Controversial matters are discussed, progress of important subcommittee studies is reported, and the results of investigation of special projects are presented for main committee acceptance or rejection.

Our supervisory committee meets six times a year. This group might be termed the "administration" or "steering" committee. Policy matters and problems that cannot be effectively assigned to subcommittees are analyzed by this group. The caliber of men appointed to this committee is extremely important, because the effectiveness of all our materials handling committee activities is influenced by the effort and initiative of our supervisory group.

Subcommittees have been established covering (1) containers, (2) conveyors, (3) highway equipment, (4) industrial trucking, (5) loading and unloading, (6) measuring methods, and (7) railway equipment.

Meetings of these groups are called at intervals frequent enough to cover their agenda. During our first year of operation it has been necessary to schedule monthly meetings of most of the groups.

All subcommittees are at liberty to call in specialized personnel from any of the divisions to assist in solving any problem on which the regular members require additional talent. It is also possible, through the General Motors production engineering section, to arrange a "joint industry conference" when matters develop of sufficient importance to be of interest to General Motors and other manufacturers.

Specific assignments of individual problems from divisions are handled directly between the affected subcommittee and the requesting division.

Matters that concern several divisions are handled by small group meetings in one of the affected plants. For example, representatives of the car divisions with a mutual problem meet with supplying divisions as well as with outside vendors.

Recommendations relative to new methods and also to new equipment are generally made to the divisions. These are based on the results of subcommittee studies involving:

1. Experience of plants presently using recommended methods and/or equipment
2. Tests run by one or more plants
3. Special investigations
4. Cost comparisons based on (1), (2), or (3)

When considering a change in either methods or equipment, we find difficulty in giving proper evaluation to intangibles. The routine of preparing cost estimates to compare old and new methods and/or equipment is fairly well established. One of our present problems is to determine a practical method of including fringe advantages and disadvantages in all cost comparisons.

6 · CADILLAC MOTOR CAR DIV.

J. H. LAMB
SUPERINTENDENT OF MATERIAL CONTROL

Analysis of materials handling problems is integral part of planning production set-ups. Line supervision is charged with responsibility for control

1. How Cadillac figures its handling costs

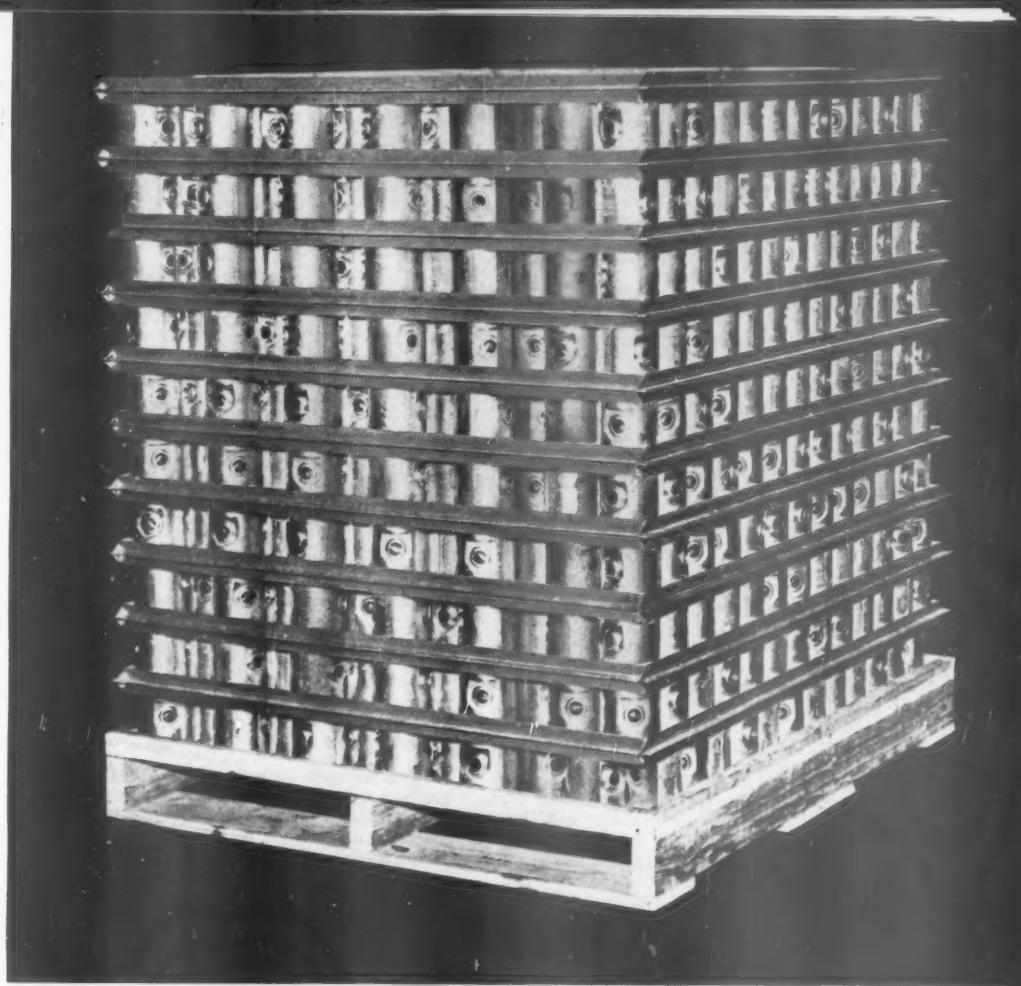
For about three years we have been operating under a decentralized system of materials handling. We have transferred the responsibility for trucking, line feeding, storing, stock checking, follow-up with purchasing and fabricating departments, etc., to our various productive divisions.

Each productive supervisor now has a much closer control of his operation. Each productive superintendent is now entirely responsible for maintaining schedule on parts progressing through his division. Buck-passing fails under this set-up.

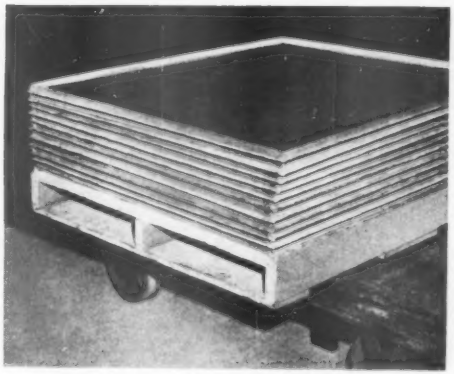
A thorough knowledge of the complexities of material procurement is obtained by productive supervisors. Our superintendent of material control coordinates the activities of our six production control supervisors who, in turn, coordinate the materials handling activities of each of their productive divisions. These production control supervisors, who are actually a part of the productive superintendent's organization, derive authority from the superintendent to make decisions and take action on all materials handling matters.

Our central materials handling organization is responsible for receiving, trucking between divisons, highway trucking, repair of both inside and highway trucks, and maintenance of general-purpose materials handling equipment such as shop trailers, pans, pallets, and baskets.

With this type of organization we have both the record of cost of the central organization and the individual cost records of each of our six productive divisions. Our plantwide record of materials handling costs is compiled in our accounting division by summarizing all charges into the materials handling ac-



PISTONS ARE RECEIVED on palletized "tray pack," containing 10 trays of 150 pistons each. When used, shipping bands are cut and operators take pistons directly from the trays without middle-man handling



EMPTY TRAYS are stacked by operator for removal as compact, easy-to-handle package

OLD WAY involved receiving pistons in corrugated boxes, resulted in much refuse and disorder

count. Our individual materials handling costs by divisions are recorded weekly against detailed operating control budgets.

For the past two years we have been expanding our use of non-productive standards. Materials handling organizations of our receiving, inter-division trucking, and final assembly divisions are now working to agreed time standards.

We keep the same type of daily record of performance and efficiency in our materials handling operations that we have used for many years in productive operations. This type of measuring stick permits immediate recognition of both decreases and increases in materials handling time. Our supervisors know their labor cost daily. They don't have to wait for weekly or monthly after-the-fact control figures.

2. *How Cadillac figures what part of this cost can be saved*

Our analysis of improvement possibilities is made on individual parts or on groups of similar parts. The tool engineers start this analysis when they receive blueprints of new parts released by the design engineers. To their previous task of determining how and where the part is to be processed, we have added the responsibility of remembering that the part also has to be handled, and that the layout of the processing area must include storage space.

The tool engineers determine the most efficient method of handling material in consultation with the materials handling engineer. Or, in many instances where several methods are proposed, a complete cost analysis is made through the standards and cost divisions.

Supervisors are notified of decisions on handling methods by means of an "operation sheet" on each part, which lists, in addition to detailed instructions for processing, the type of equipment in which the part is to be handled.

Instructions on handling equipment and packaging information on purchased parts are transmitted through the planning department to the purchasing department and then to vendors through "manufacturing specification sheets" issued by the materials handling engineer. These list the type of container in which this part is to be shipped, in addition to information regarding conditions under which the part is to be purchased.

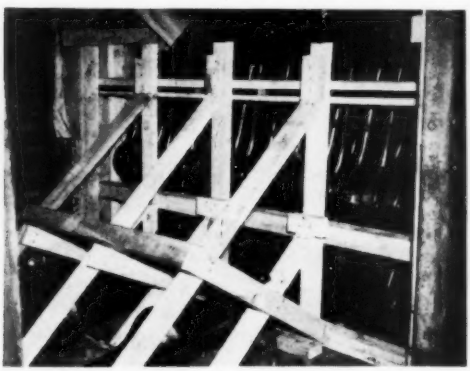
Ideas for improving methods already in effect are discussed by the materials handling engineer, or a member of his staff, with the supervisor on the job. If expenditures are necessary to initiate the proposed method, a cost study is compiled covering the estimated cost, probable savings in released equipment, labor, floor space, and all the intangible factors.

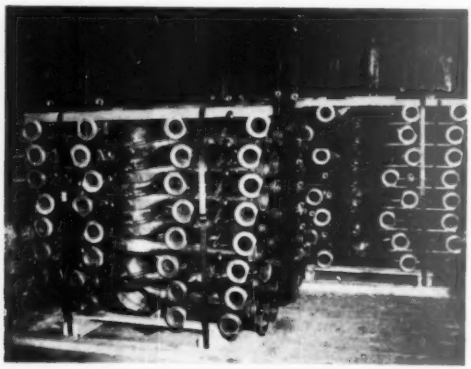
3. *How Cadillac decides what types of handling equipment to buy to do the job*

A specific handling group, headed by a well-qualified, trained, and experienced materials handling engineer, is a part of our methods and equipment division. It is the duty of this group to plan, design where necessary, investigate, test, and acquire all materials handling equipment. The supervisors who have the responsibility of actually handling the material are, of course, consulted. In fact, many requests and recommendations originate with these men and are then studied with our materials handling engineer, who is in touch with new conditions and improvements in equipment.

Regularly scheduled meetings with materials handling, production control, and standards supervisors are held by our materials handling engineer to consider improved methods and equipment. Subjects of discussion include the potential worth of new developments in shop trailers, trailer casters, trailer hitches, general-purpose shop boxes, baskets, racks, pallets, returnable containers, industrial trucks, highway trucks, highway trailers, scrap trucks, rubbish trucks, portable conveyors, etc.

Proposals for expenditures are supported by cost studies which reflect estimated annual savings and the length of time that will be required to amortize new equipment.





OLD AND NEW methods of shipping axle housings require the same amount of lumber and banding material, but use of expendable pallets has brought a saving of 4.7 man-hours per car load

REELS were formerly rolled 450 feet from wire rope department to loading dock. Fork truck now takes ten or more reels per trip. Handling costs for this particular job are down 90 per cent

7 · R. G. LeTOURNEAU, INC.

JOHN HARDER
CHIEF INDUSTRIAL ENGINEER

Simple but effective approach to handling problem includes incentive plan plus special reports. Result: Costs have been reduced 50 per cent

Materials handling costs for individual handling operations are accurately established and maintained at LeTourneau. Costs are down 50 per cent. Here's how it is done:

1. Standard practice instructions are established for all materials handling operations.

2. Time studies are made of each materials handling operation.

3. A standard posting sheet is maintained daily which shows the performance of each employee in the materials handling department.

4. A complete materials handling expense report is issued monthly which shows all expenses chargeable to the materials handling department.

All materials handling operators are on an incentive plan. This helps to increase efficiency and lower over-all materials handling expense. Workers show more interest in their jobs and contribute many suggestions for improvements.

As a result, we know what it costs to load materials by hand and also what it costs to transport loaded materials by overhead crane, iift truck, or electric hand trucks. Likewise, we know the difference in cost between pallets and other containers.

We know what it costs us on a per-piece basis regardless of load size, because we know the per-load time involved. In this way we can stress the importance of transporting full loads. Also, since we know our volume we can determine the most economical equipment to use for a given type and volume to be transported.

As soon as the volume of materials handled decreases, it is immediately reflected in the performance index (used for incentive pay) of the operator in the materials handling department. When this performance index *decreases*, it is a good indication that the unit cost *is increasing*. This then calls for an adjustment in the materials handling manpower available, or even a change in the type of equipment being used. As a result, we are constantly aware of handling costs and can make changes quickly.

The paperwork we use to establish and control handling costs is as follows (only the first three items are illustrated):

1. Standard Practice Bulletins (see exhibit on page 88) cover all materials handling operations. They describe how time studies are made. They show how standards are built up and how they are to be applied. As these studies are taken, refinements and changes are made. If the study shows the area serviced by particular pieces of equipment is too large or too small, an adjustment in size of areas is made. If too many moves are made empty or with small loads, steps are taken to correct the condition.

2. Time Study Observations (see exhibit on page

STANDARD PRACTICE FILE WORD _____

SUBJECT: Overhead Cranes—Plant No. 2 PROCEDURE NO. _____

DEPARTMENT: 045 Transportation DIVISION: SHEET NO. 1 OF 3

COMPILED BY: APPROVED BY: J. Kauzlarich DATE

REVISED BY: N. Salisbury REVISION NO. 1 DATE 11/20/47

COPIES TO: J. Bainter, W. Beard, E. Bachman, W. Wall, C. D. Cook

OPERATION: Standards are set to cover the work done by the overhead crane including the crane operator's and the hooker's work. The work consists of hauling bins, skids and any miscellaneous items from one location to another including all necessary arranging, stacking, loading or unloading at the beginning or end of trip.

LOCATION OF SERVICE: Crane numbers 2046 and 2047 normally operate the full length of the plant, while crane number 2045 is operated in the "El."

DEFINITION OF STANDARDS:

TIME STUDIES: All studies were taken for a full eight-hour shift (both day and night) noting the following information:

1. Location trip started from
2. Destination of trip
3. Description of load carried (noting empty moves)
4. Description of all miscellaneous work including servicing machines, handling miscellaneous items, and other related work

RECAPITULATION: Following is the breakdown required of the studies:

1. Moves with tickets
2. Moves without tickets (intra-departmental)
3. Move empty bins or skids
4. Servicing machines
5. Other miscellaneous work

ANALYSIS: The moves with tickets are considered directly measured and checkable. The moves without tags, moving empty bins or skids, servicing machines and other miscellaneous work are considered to be uncheckable. In the case of these cranes, 84 per cent of the total units on the studies evolved from ticket moves. This was considered sufficient to directly check the work from move tickets after inserting into the standard per ticket all uncheckable work.

Following are the steps taken to build up the direct application:

1. From the recap of the time studies, the total move tickets were plotted against the total units of work shown on the time studies.

STANDARD PRACTICE INSTRUCTIONS are issued for each handling operation, provide solid foundation for the wage incentive plan that has helped LeTourneau lower its materials handling costs 50 per cent

89) are taken for every materials handling operation. Observers were selected and trained to record, analyze, and establish a standard rate for each handling job.

3. **Daily Posting Sheets** (see exhibit on page 89) show performance of each operator. A premium is paid for each index point above normal in direct proportion to base pay. The performance record is used to determine when adjustments are necessary in the number of operators in the materials handling department. When the individual index drops below the normal index for any continued length of time, it is an indication that the work load has decreased to the point where fewer men are required.

4. **Monthly Expense Reports** list the cost of items chargeable to the materials handling department. Costs are listed for the current month, preceding month, and the total cost for the year to date. Accurate maintenance of these costs for each account, plus close control by time study, enable us to know actual handling costs and variations from normal.

5. **Mechanical Work Orders** are originated when a piece of materials handling equipment needs repair or service. By tabulating work orders, it is possible to know the frequency and cost of repair for each piece of equipment. In this manner, equipment frequently in need of repair can be accurately controlled and replacement made as necessary.

TIME STUDY OBSERVATION SHEET PAGE ____ OF ____

DATE 1/5/48 DEPT. 048 PART NO. _____ JOB NO. _____ MACH. NO. _____

OPERATION Cutting Dept. Mercury Truck OPERATOR NO. 1028 T.S. MAN Harrison

START 7.00 A.M. STOP _____ ELAPSED TIME _____ TS-OS NO. _____

FROM	TO	WITH	DESCRIPTION	READING	UNITS
			Sign move ticket	8 4/10	
			Move under bin and raise	8 4/15	
Bay 6	Insp.	Bin	Move load	60 68/20	
			Wait for ticket to be signed	12 sec.	
Insp.	Bay 5	Empty	Return	47 7/20	
			Get off truck, sign move ticket	12 5/10	
			To truck, position and raise skid	10 6/15	
Bay 5	Press	Skid	Move load	38 7/20	
			Position load on press	195/	

TIME STUDIES are taken of all handling operations. Readings are in seconds; numerator of fraction represents accomplishment factor; denominator, fatigue allowance expressed as a percentage

STANDARD POSTING SHEET DEPT. 048 GROUP Material Handling SHIFT / WEEK ENDING 9/18/48

Clock Number	NAME	DATE 9-12 Total Hrs. D.W.	Hours On L.T.	Total Units P.A.	Index	Prem. or Units Below	D	Avg. Index	Total Hrs.	D.W. Hours	Total Premium Units	Clock Number
21	H. Miller	8	6	481	80	120	8	76	40	12	440	21
		2		0								
75	R. George	8	8	627	76	155	8	79	40½	1	750	75
				5								
		9½	9½	177			8					

		Total Hrs. 65¾	Hours On 63¾	Total Units 4710	Daily Net 68	Prem. 1090		Net 74	Total Hrs. 364	Hours On 305	Prem. Units 5205	Total Units 22607
		D.W. 2	L.T.	P.A. 180	% On 97	Units Below		% On 84	L.T. Hours	D.W. Hours 59	Units Below 0	Total P.A. 895

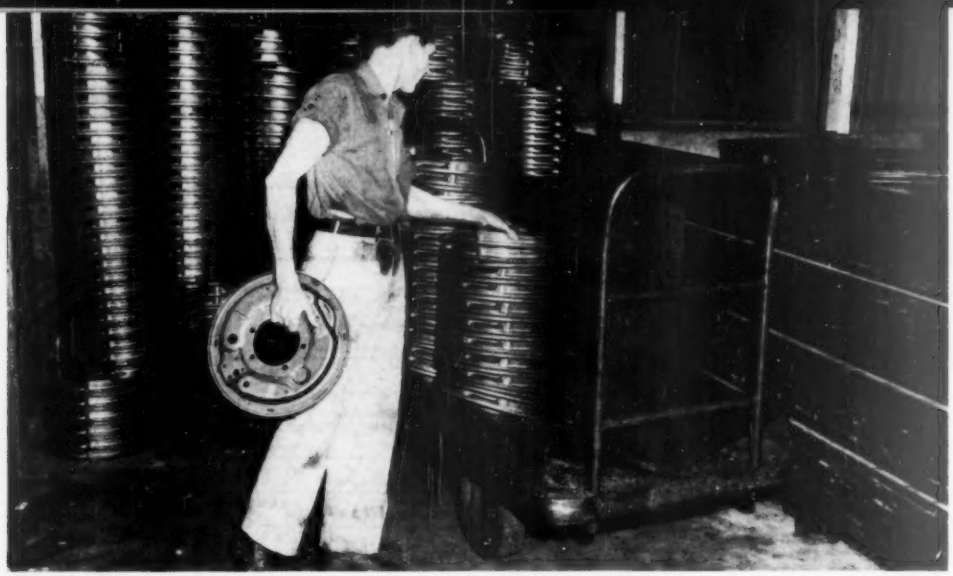
DAILY PERFORMANCE of each operator is posted to this sheet. Premium is paid for index points above normal. DW stands for daywork. LT signifies lost time. PA means process allowance

6. Downtime Reports are maintained for repairs and repair costs. They enable us to determine the point at which it becomes non-profitable to operate present equipment. They also help in choosing the type of new equipment to be purchased.

7. Fuel Consumption Reports are issued monthly. These reports enable us to judge and compare the various types of equipment. If excessive consumption of fuel or lubricants is shown on these reports, the vehicle is repaired. In choosing new equipment, careful analysis is made of all these records.

This comprehensive materials handling program at LeTourneau was designed with an eye to increased efficiency and lower handling costs. Standard practice instructions have established a definite routine for each materials handling operation, and supervision sees that this routine is followed, except under special circumstances. Time studies of materials handling jobs have made it possible to establish accurate costs for each materials handling operation and to install a materials handling incentive program. The several other reports and forms aid supervision in determining the cost of operation and maintenance—when equipment should be overhauled or completely replaced.

The service records maintained for the various types of equipment now in use are a great aid in determining what types of equipment to purchase when new equipment is needed.



BEFORE Shields were removed from truck by conveyor, then stacked in bins. When needed, the shields were loaded manually on specially designed hand truck for delivery to operation

8 · Wagner Electric Corp.

W. A. OKENFUSS
ASSISTANT GENERAL SUPERINTENDENT

Efficient materials handling is a joint responsibility, shared by supervisors in all phases of production. The result is close control of tightly budgeted costs

Efficient materials handling methods are the responsibility of everyone at Wagner Electric. When a change in layout or a new method of handling is being contemplated, the process engineering, maintenance, time study, methods and standards, inspection, and production supervision departments all work together to find the most efficient method.

We use almost every type of materials handling container and conveyance device. Large overhead cranes and hoists are used on the assembly floor in our transformer department. Throughout our many machine shops and subassembly departments, almost every type of overhead and floor-level conveyor line is used. We also employ all types of pallets, gondola boxes, and other containers to move material from the receiving department to primary operations and from final operations to the shipping dock. Various types of handling trucks (platform, tractor, and fork) are used to move materials from and to departments.

We know what handling is costing us. All our departments operate on yearly budgets. Through special account numbers we are able to tell how much indirect materials handling labor is used by each department. These accounts tell us how much handling equipment is charged to each department and the amount of depreciation. It is easy to determine the improvements being realized by each of our departments at any time during the calendar year.

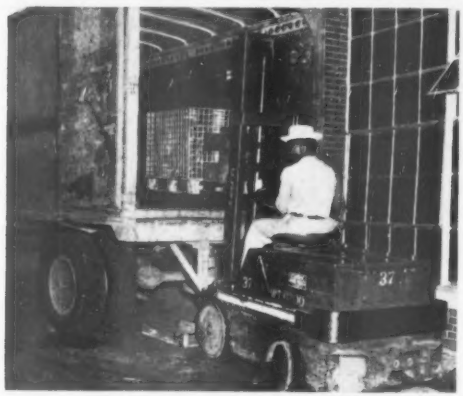
We time-study and analyze materials handling operations very carefully. However, this is done only when a new layout or a change in method is being considered. When such changes are being planned, the time study department is informed. It is then its responsibility to conduct a complete analysis and investigation of all critical operations that will directly or indirectly aid the management group in making a final decision.

How a Better Method Is Worked Out

Here is how a better materials handling method is decided upon at Wagner. Everyone related to the manufacturing operation is required to contribute to the improvement study. Process engineers determine if the new handling technique will affect the fabrication method. If so, they decide if changes can be made that will result in more efficient fabrication methods. The maintenance department carefully reviews the new materials handling device to determine how well it will hold up and how much servicing it will require.

Time study men are responsible for determining

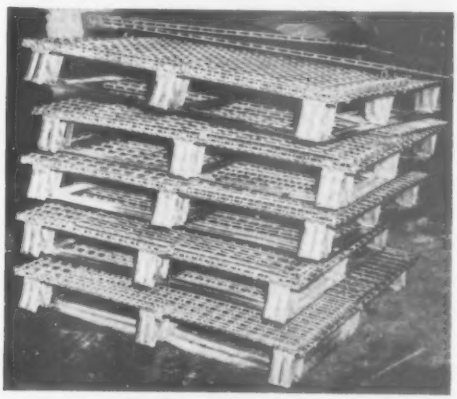
AFTER Shields are loaded directly into collapsible wire containers in the truck in which they are received. No longer is there a need to maneuver conveyor into the van of the truck. Then . . .



. . . fork truck picks up container from tailboard. A second handling has been eliminated at . . .

. . . storage, where containers can be stacked without need for unloading. Fork truck delivers to . . .

. . . operator, who takes parts from container instead of from manually loaded hand truck. When . . .



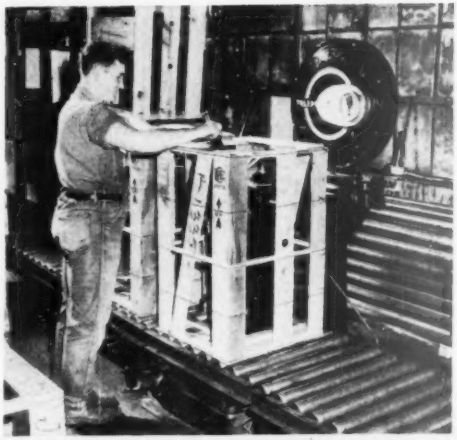
. . . empty, containers fold up, occupy minimum of space until used at beginning of next cycle

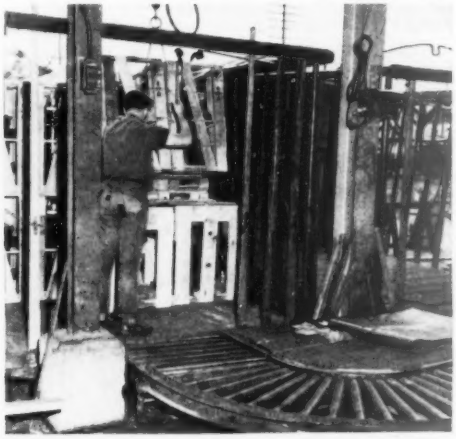
the actual efficiency and cost of the old versus the new method of handling. This analysis by the time study men is considered of the utmost importance when final decisions are made. Our method men conduct a thorough investigation of the present versus the proposed method. They determine what effect the new method will have on the worker and the over-all relation of the proposed method to the plant-wide handling program. A complete process and flow analysis of almost all proposed changes is made by this group. With this analysis it is easy to determine the distances traveled, the number of stops (stores) during transport, and the number of moves required, with their individual distances. While this investigation is being conducted by these various groups, departmental production supervisors and top management review the proposals and offer their counsel for further improvement.

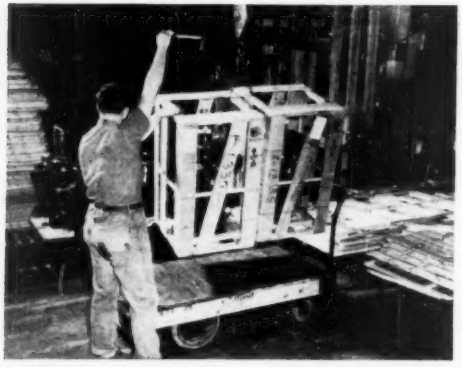
On minor changes in handling methods, management and departmental production supervisors often confer and decide within a few minutes. However, on more extensive materials handling changes which affect the complete plant or major departmental changes, these men conduct a complete investigation. Very often this takes weeks or even months to complete. When all the results are compiled on the various investigations, these men have a final conference and weigh the advantages and the disadvantages before making their decision.

Materials handling costs are in a downward trend at Wagner Electric, as proved by two examples. The first is an improved handling method in our transformer department. A change from manual labor to conveyor handling reduced labor costs some 53 per cent and paid off in less than 12 months.

The second improved method was devised for unloading steel backing plates in the truck and passenger car brake division and delivering them to the primary operation. Previously, they were unloaded by hand, placed on roller conveyors, and stacked by hand in bins. Workers now load these plates directly into wirebound containers, which are picked up by a fork truck and placed in storage. Handling costs are down more than 65 per cent, and twice as many plates can be stored in any given area.







BEFORE Transformers were picked up at end of line, placed on truck, removed for weighing, returned to truck, wheeled to loading dock, and transferred to van for shipment—had to be lifted four times

AFTER Scale is actually part of final line, which feeds crates to inclined belt for descent to dock level. Crates then ride rollers to tailboard of waiting van. There are no stops for lifting

9 · NATIONAL CASH REGISTER CO.

RALPH J. WOOD
SUPERVISOR, STOCK DIVISION
WALTER G. BOSWELL
SUPERVISOR, STANDARDS AND COST CONTROL DIVISION

Hard-and-fast classification of personnel chargeable to materials handling accounts. Variable budgets for controlling this expense show where to save

The total number of moves of all parts required to build an average-size cash register is 94,284. The number of parts handled monthly throughout the plant now averages about 70,000,000. This handling takes place through 27 buildings, 42 floors, and 1,666,000 square feet of floor space served by more than 6 miles of aisleways for over 88 industrial trucks, more than 3 miles of railroad trackage, and 9715 feet of transporting (now assembly-line) conveyors.

Despite this vast movement of materials, our latest figures indicate that the cost of stock handling at NCR amounts to only 4.3 per cent of total payroll. (A complete list, by functions, of the 21 personnel groups considered by NCR to be engaged in materials handling will be found on page 94.)

We have reason to believe that our 4.3 per cent for stock handling is a low percentage, considering the size and nature of our handling operations. Yet it is being reduced constantly. With a change in our philosophy of materials handling, we could effect a tremendous "apparent" saving in even this low handling cost.

Philosophy of Materials Handling

NCR management does not regard handling as an end in itself, but as a service operation. Its purpose is to facilitate all phases of production. Consequently, measures that might reduce the costs directly chargeable to handling must also be considered from the standpoint of their effect upon the over-all cost of factory operation. Therefore, questions involving the cost of handling must be a matter of teamwork between the stock division (which includes the transportation department) and the manufacturing inspection and engineering departments, the factory layout department, and any other departments that might be involved.

Problems must be settled in the way that assures maximum benefit to the company, even though the solution may increase rather than reduce the actual handling costs. It is our experience that measures involving handling that increase factory efficiency and save money will, as a rule, increase the efficiency and reduce the cost of the handling operation. But the test is always based on over-all results, not handling alone.

NCR management is also convinced, by long experience, that the maintenance of attractive surroundings and ideal working conditions is essential. They add to the employee's pride in his work, his loyalty to the company, and his personal standards of workmanship. Therefore, all handling practices are geared to the demands of good housekeeping, as well as safety and other welfare considerations. One of the chief reasons for having our own railroad and using fireless and sootless locomotives lies in the maintenance of the cleanliness of the factory and the beauty of the grounds.

Organization and Control of Handling

Interdepartmental handling of stock at NCR centers in the stock division. The vast number of kinds of small parts that must be stored and handled at the plant makes even the efficient stocking of these parts an intricate task. Measures affecting the handling of the myriad parts, or even of the raw materials from which they are made, must necessarily be considered in connection with problems of stock location. The need for centralized control of stocking and handling has been so evident that the advisability of having both tasks under the same supervision has never been seriously questioned.

The stock division consists of the stock ordering department, the finished stock department, the stock and transportation department (which includes receiving, raw stock, and transportation sections), and the traffic and garage departments.

In the stock division, there are 21 different job classifications engaged wholly or partly in actual materials handling. These jobs, with descriptions of activity and responsibility, are listed in the accompanying table (see page 94).

The Budgeting Process

Labor in the stock division is mostly daywork, paid for on an hourly basis. Where a stockhandler or stockroom attendant performs the same kind of work all week, a weekly labor ticket is made out indicating the number of hours worked each day chargeable against the account. A standard day of 8 hours, and 40 hours for the week, are shown on the ticket.

The clerk who makes out the time ticket enters the account number to which the work is chargeable. Each day, after checking the attendance record, he writes out a labor ticket. On Friday, or at the close of the week, he totals the hours worked and sends the time ticket through for payment, after adding the rate.

In the payroll department, the time tickets are extended, checked, and run through a payroll machine, which mechanically accumulates the total department payroll and the totals charged to various accounts.

Reports compiled from the resulting budget sheets are sent weekly to the departments concerned. Summaries of these reports are sent to the division super-

NCR CLASSIFICATION* OF MATERIALS HANDLING PERSONNEL

Material handlers (Job Classification No. 576). Unload materials, merchandise, and other incoming items by hand or with the aid of skids, hand hoists, cranes, etc.

Packers (620). Receive company products after final inspection; furnish proper supplies and guarantee; requisition all cartons, fillers, supplies, etc.; stick and make up cartons; pack registers; and put on proper shipping labels.

Packer-stenciler-checkers (1140). Check products and supplies to insure correct packing.

Special assignment man (738). Duties may consist of tracing special stock and other items urgently needed. Writes up orders for special parts; investigates complaints and irregularities; must report directly to either a supervisor or foreman.

Finished stockkeepers (759). Receive, store, and issue finished stock in a stockroom; check incoming stock against invoice card by counting or weighing; place stock in bin or location allotted; fill orders; requisition stock; take periodic inventory and keep perpetual inventory.

Finished stockkeeper (1129). Women performing duties of 759 (above) where parts are small and light.

Head stockkeepers (766). Check incoming stock cards with invoice card to see if stock is old or new style; select kind and size of bin where it should be stored, entering bin numbers in a master index; receive repair requisitions and record bin numbers, page numbers, etc.; record re-operations on parts drawn from stock; make out new stock cards; make out tracer sheets when required.

Raw stockkeepers (767). Fill requisitions for raw stock by counting or weighing; deliver stock to department ordering; store raw stock returned for credit.

Stock tracers (839). Trace urgent and overdue parts and assemblies; expedite to stockrooms, delivering personally where possible by means of small electric truck; arrange partial quantities of parts by a "sent ahead" system when whole quantities are not available.

Head truckers (844). Operate power trucks; instruct and explain methods and procedures to others.

Motor truckers (846). Transport parts and other items on power-driven trucks; load and unload trucks.

Hand truckers (845). Transport material or parts by hand trucks; load and unload trucks. (Only truckers employed in handling within departments; under supervision of departments in which they work.)

Finished stockkeeper (764). Receives, stores, and issues finished parts; makes up sets of key-tips, key-checks, etc., in stockroom.

Checkers (991). Receive cabinet orders for cash register assembly; check orders; obtain parts from stock; enter stock on invoice card; forward parts to enameling inspection; when quantity is below ordering limit, deliver invoice card to card clerk in department, and check for irregularities in production orders.

Special stock preparation men (1357). Select stock necessary to build bodies, printers, etc., according to size and type of machine.

Head motor truckers (917). Direct handling activity in receiving department.

Job leader in lumber yard (1136). Assists engine crew in spotting lumber cars; sees that lumber is unloaded at proper locations.

Invoice man (1361). Invoices all raw stock items by weighing, measuring, counting, etc.; reports same to stock ordering department.

Transfer station operators (841). Transfer boxes of stock from one conveyor belt to another, or to the vertical conveyor.

Parcel post truckers (847). Deliver parcels, mail, inter-office memoranda, etc., to departments within plant, using small electrically driven trucks.

Gasoline truck drivers (848). Transport materials, merchandise, equipment, and men; load and unload trucks, with assistance (when necessary) of a helper.

*Job classification numbers are shown in parentheses.

THE 21 JOBS LISTED ABOVE ARE CONSIDERED PART OF MATERIALS HANDLING AND ARE ACCOUNTED AS SUCH IN . . .

visors and to the vice-president in charge of manufacturing. These actual expenditure performance reports may be compared with the departmental budgets, which have been prepared to cover all controllable departmental expenditures (those expenditures over which the supervisor presumably has some measure of control). A sample of the summary, using hypothetical figures, is shown on the next page.

The weekly departmental budget sheets contain:

1. The dollar value of direct labor charged into work in process that week. This is the base of the variable budget, which is a predetermined percentage of direct labor.

2. The expense items pertaining to the departments in question. These are indicated by the account numbers and descriptions.

The department accounts are divided into those controllable by the department foreman and supervisor of the division, and other payroll items of expense authorized by company policy, but not controllable by the foreman in his department.

Solving a Specific Problem

The following is an actual account of how one handling problem disclosed by the budget was solved. It illustrates, in general, the methods employed in figuring what part of the cost of materials handling can be saved and the methods taken to solve each problem. In order not to reveal actual costs, hypothetical figures have been used. The case, however, is an actual case that was disclosed by the budget and solved in the manner described.

The summary form (page 95) for the week of

VARIABLE BUDGET SUMMARY

DIVISION STOCK CONTROL WEEK ENDING SEPT. 2, 1948

DEPARTMENT	THIS WEEK			YEAR TO DATE		
	BUDGET	ACTUAL	DIFFERENCE*	BUDGET	ACTUAL	DIFFERENCE*
#31 RECEIVING	3,750	3,800	50	118,065	121,607	3,542
#32 RAW STOCK	5,000	5,575	575	157,420	174,800	17,380
#33 FINISHED STOCK	26,550	27,277	(727)	1,062,000	1,068,400	(6,400)
#34 TRANSPORTATION	8,500	8,620	120	267,615	278,542	10,927
#35 STOCK ORDERING	8,750	8,600	150	275,486	274,294	1,192
TOTAL	52,550	53,872	1,322	1,880,586	1,917,643	37,057

*Figures on gray panel denote over-budget variations

. . . THE VARIABLE BUDGET, WHICH IS BASED UPON A PERCENTAGE OF DIRECT LABOR USED DURING THE PERIOD

September 2 for the stock control division contains a red variance (over budget) for the finished stock department for the preceding week of $727. The appearance of so large a red variance for a single week (which had averaged only $200 per week for the preceding 32 weeks) caused the supervisor of the stock division to check the weekly budget report against the departmental budget.

From this comparison, he noted that all the items of controllable overhead were in balance except account 74003 (truckers), which showed an over-budget cost of $727. He therefore requested the head of the factory standards and cost control division to make a study of trucking costs for the finished stock department.

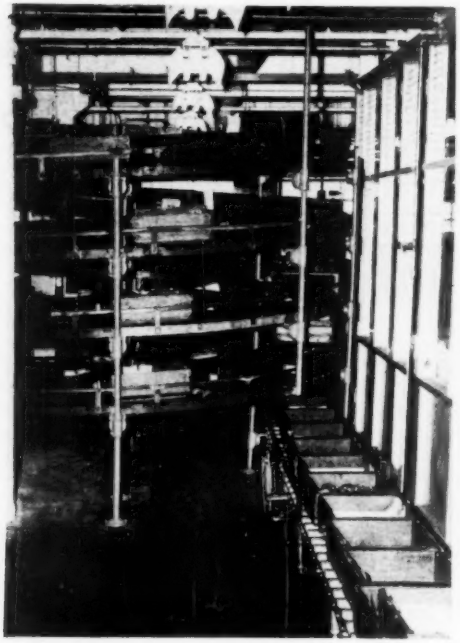
The first step toward a solution was to assign a methods engineer to make a process flow chart of the operation. Following this, a time study was made of the operations disclosed by the flow chart. The chart and the study covered operations in which three truckers were employed to handle the incoming and outgoing toteboxes in one of the departments. An engineering analysis of the flow chart and time study report revealed the following:

1. Boxes were received in the department from the previous department over the conveyor system.

2. Boxes were placed on dollies or hand trucks by truckers and taken to the storage area, where they were stacked in rows.

3. An order card (which travels with each box) was removed by the trucker, and a location number in the storage area was placed on the card.

4. The trucker took the card to the department



NEW WAY **Parts are delivered over powered roller with spiral gravity drop**

COMPLETING ORDER, operator places box on air-operated lift, which raises it to roller conveyor

clerk, who wrote the labor ticket and delivered the card and the labor ticket to department supervision for the next assignment to an operator.

(The above duties required 50 to 60 per cent of one trucker's time.)

OLD WAY **Getting parts to and from machine by hand truck required full time of three men who lost much time in locating boxes**

5. The operator, upon completing his box or boxes of stock, placed them along the margin of the main factory aisle.

6. The truckers received the completed order cards from the department clerk, located the box along the main aisle and distributed the respective order cards to each box in accordance with its identification number. (Frequently the operator did not spot his boxes nearest the row in which he worked because boxes already occupied the area. In this event, he carried them farther along to the next available space. This caused lost time on the part of the trucker due to the difficulty in locating these boxes.)

7. After the machine operation had been performed, the work was placed on a hand truck by the hand trucker and moved to the outgoing conveyor station.

8. The trucker placed boxes on the conveyor, which moved boxes to the next operator, according to the routing on the parts.

(Items 6, 7, and 8 occupied about two and one-half truckers' time, but it was noted during the time study that two of the truckers worked together at least 70 per cent of the time.)

A summary of the flow chart and time study, together with recommendations on improvement, were written by the standards department and submitted to the supervisor of standards and cost control. He sent the data to the supervisor of the stock division, who had requested the survey.

NEW Subscription Order

Enter a new subscription to FACTORY Management & Maintenance and bill me as checked below:

☐ 3 Years for $5 ☐ 1 Year for $3

Name_____

Street and No._____

City_____ Postal Unit No.____ State_____

Company_____ Position_____

NOTE: *One Year Rates Outside U.S.A.:* Canada $4; Latin America $4; Foreign $15. JAN.-49

NEW Subscription Order

Enter a new subscription to FACTORY Management & Maintenance for:

Name_____

Street and No._____

City_____ Postal Unit No.____ State_____

Company_____ Position_____

Send bill for: ☐ 3 Years at $5 ☐ 1 Year at $3

Name_____

Street_____ City & State_____

NOTE: *One Year Rates Outside U.S.A.:* Canada $4; Latin America $4; Foreign $15. JAN.-49

's central parts delivery r operations

sible for equipment). Here the results of the survey were discussed thoroughly, and the following conclusions reached:

1. Truckers were spending most of their time on boxes of stock which were completed and ready to move to another department for further processing.

2. Congestion along the main factory aisle resulted when operators were running short-cycle jobs, and the truckers could not remove the boxes fast enough.

3. Practically all of one trucker's time could be saved under the present conditions by assigning certain functions to each trucker and eliminating the duplicated effort of their working together.

Accordingly, members of the conference suggested a conveyor system which would enable the operator to dispose of his completed stock boxes as they were finished, instead of storing them along the aisle. This, it was felt, would reduce work-in-process time and eliminate congestion, while also saving the time of two truckers.

The factory layout department suggested the installation of air lifts—like those used at the outgoing points—at intervals along the factory aisle (20 to 30 feet apart) with a gravity roller overhead conveyor. This type of equipment was proposed because the overhead conveyor would not take up floor space and could be tied into the present conveyor system, which

the various floors in

machine operator now earest the row of machines in which he works. The box is moved by the overhead belt conveyor to the gravity roll spiral conveyor, where the department clerk is located. The clerk, without removing the box from the conveyor, obtains the labor ticket and order card from the box, makes the necessary entries, and replaces the order card in the box. Then, by operating a hand-lever-type trip, the clerk releases the box to an inclined belt conveyor which is tied into our factory conveyor distribution system.

Immediately following the installation of the new equipment, a new process flow chart was made, and a time study was taken. The total time required for the unit of production studies (a dolly load of toteboxes) was reduced from 14.85 minutes to 5.60 minutes, and the total distance through which the trucking operator was required to transport the material was reduced from 350 feet to 60 feet. These results verified the original estimates.

The finished stock department's budget performance report for the first full week following the installation completion and personnel changes showed a net red variance (over budget) of only $28, which represented a percentage difference between the budgeted controllable overhead and the actual total controllable overhead of only 0.1 per cent. The results of the study, as well as the cost of the installation, were therefore completely justified.

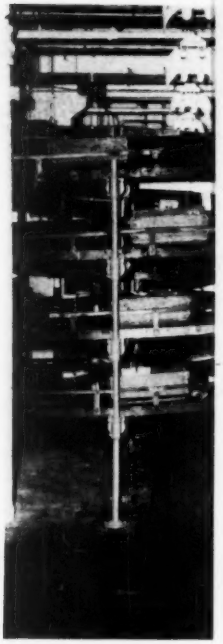
FIRST CLASS
PERMIT No. 64
(Sec. 510 P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In The United States

4¢ POSTAGE WILL BE PAID BY—

McGRAW-HILL PUBLISHING CO., Inc.

FACTORY Management & Maintenance
330 WEST 42nd STREET
NEW YORK 18, N. Y.



NEW WAY Parts are d with spiral

clerk, who wrote the lat card and the labor ticke for the next assignment

(The above duties req one trucker's time.)

FIRST CLASS
PERMIT No. 64
(Sec. 510 P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In The United States

4¢ POSTAGE WILL BE PAID BY—

McGRAW-HILL PUBLISHING CO., Inc.

FACTORY Management & Maintenance
330 WEST 42nd STREET
NEW YORK 18, N. Y.

from the department clerk, located the box along the main aisle and distributed the respective order cards to each box in accordance with its identification number. (Frequently the operator did not spot his boxes nearest the row in which he worked because boxes already occupied the area. In this event, he carried them farther along to the next available space. This caused lost time on the part of the trucker due to the difficulty in locating these boxes.)

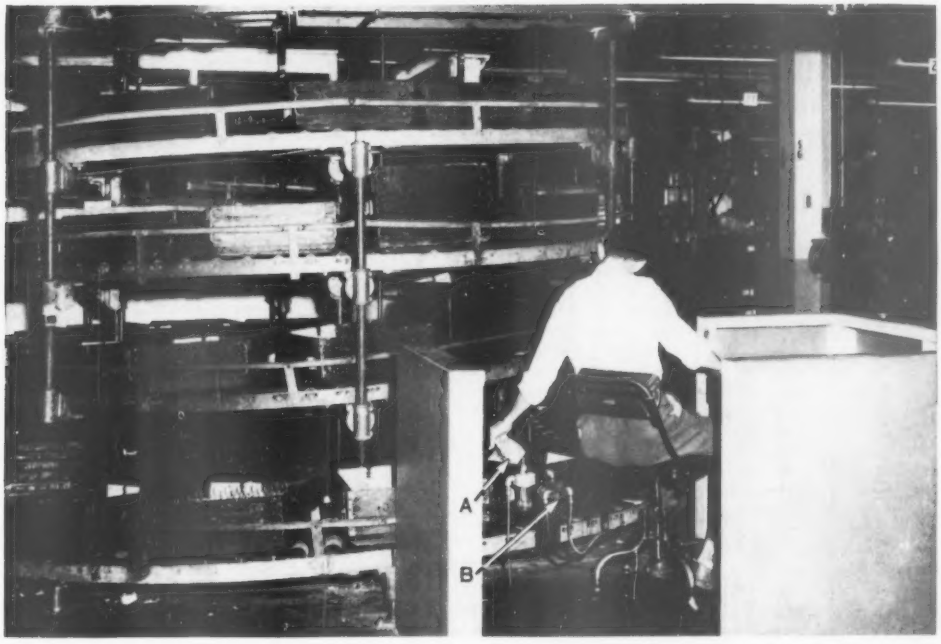
7. After the machine operation had been performed, the work was placed on a hand truck by the hand trucker and moved to the outgoing conveyor station.

8. The trucker placed boxes on the conveyor, which moved boxes to the next operator, according to the routing on the parts.

(Items 6, 7, and 8 occupied about two and one-half truckers' time, but it was noted during the time study that two of the truckers worked together at least 70 per cent of the time.)

A summary of the flow chart and time study, together with recommendations on improvement, were written by the standards department and submitted to the supervisor of standards and cost control. He sent the data to the supervisor of the stock division, who had requested the survey.

OLD WAY Getting parts to and from machine by hand truck required full time of three men who lost much time in locating boxes



AT OUTGOING SPIRAL, clerk records data from order card (A), then presses air release handle (B), which returns the box to the factory's central parts delivery conveyor system for use in later operations

The next step toward corrective action was a meeting attended by representatives of the stock division, standards department, factory layout department, the machining department, and the tool division (responsible for equipment). Here the results of the survey were discussed thoroughly, and the following conclusions reached:

1. Truckers were spending most of their time on boxes of stock which were completed and ready to move to another department for further processing.

2. Congestion along the main factory aisle resulted when operators were running short-cycle jobs, and the truckers could not remove the boxes fast enough.

3. Practically all of one trucker's time could be saved under the present conditions by assigning certain functions to each trucker and eliminating the duplicated effort of their working together.

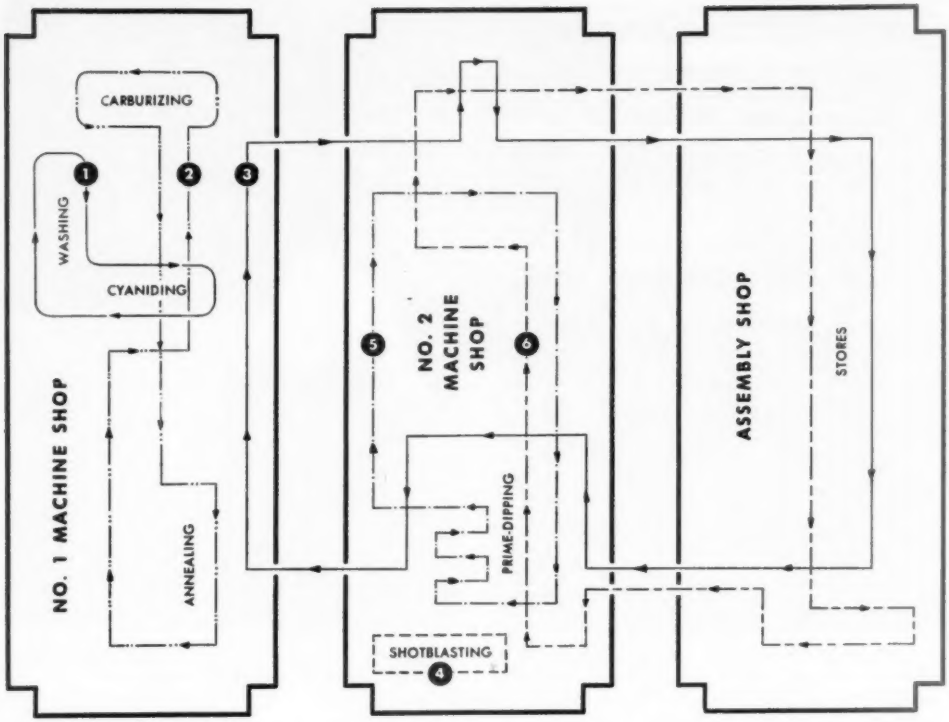
Accordingly, members of the conference suggested a conveyor system which would enable the operator to dispose of his completed stock boxes as they were finished, instead of storing them along the aisle. This, it was felt, would reduce work-in-process time and eliminate congestion, while also saving the time of two truckers.

The factory layout department suggested the installation of air lifts—like those used at the outgoing points—at intervals along the factory aisle (20 to 30 feet apart) with a gravity roller overhead conveyor. This type of equipment was proposed because the overhead conveyor would not take up floor space and could be tied into the present conveyor system, which transports the stock boxes to the various floors in each building.

With such an installation, the machine operator now places a box on the air lift nearest the row of machines in which he works. The box is moved by the overhead belt conveyor to the gravity roll spiral conveyor, where the department clerk is located. The clerk, without removing the box from the conveyor, obtains the labor ticket and order card from the box, makes the necessary entries, and replaces the order card in the box. Then, by operating a hand-lever-type trip, the clerk releases the box to an inclined belt conveyor which is tied into our factory conveyor distribution system.

Immediately following the installation of the new equipment, a new process flow chart was made, and a time study was taken. The total time required for the unit of production studies (a dolly load of toteboxes) was reduced from 14.85 minutes to 5.60 minutes, and the total distance through which the trucking operator was required to transport the material was reduced from 350 feet to 60 feet. These results verified the original estimates.

The finished stock department's budget performance report for the first full week following the installation completion and personnel changes showed a net red variance (over budget) of only $28, which represented a percentage difference between the budgeted controllable overhead and the actual total controllable overhead of only 0.1 per cent. The results of the study, as well as the cost of the installation, were therefore completely justified.



THREE MAIN BUILDINGS of plant are linked by six trolley conveyors of integrated, adjustable speeds that provide balanced flow of finished parts from machine shops to stores, then to assembly lines

10 · STANDARD MOTOR CO., LTD.

British tractor plant starts from scratch with brand-new layout, uses integrated conveying system to insure flow production and low handling costs

Eleven miles of conveyors at the Coventry, England, plant of Standard Motor Company, Ltd., are so completely integrated that they provide automatically balanced production of up to 30 Ferguson tractors per hour.

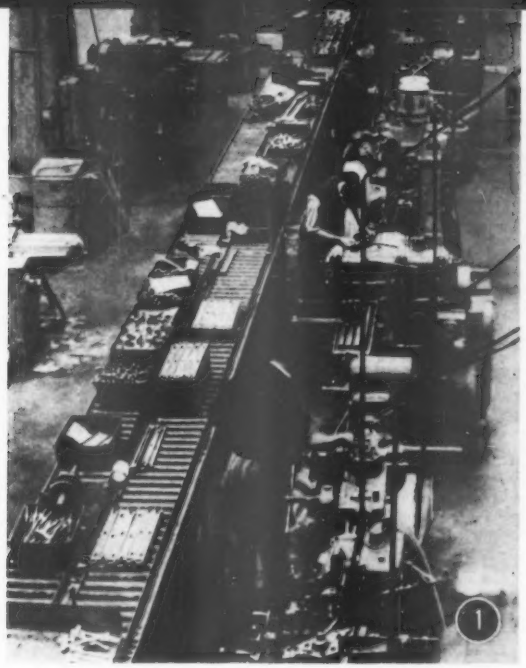
Relative speeds of all component conveyors have been established. It is, therefore, possible to change pace as the rate of production varies according to availability of materials.

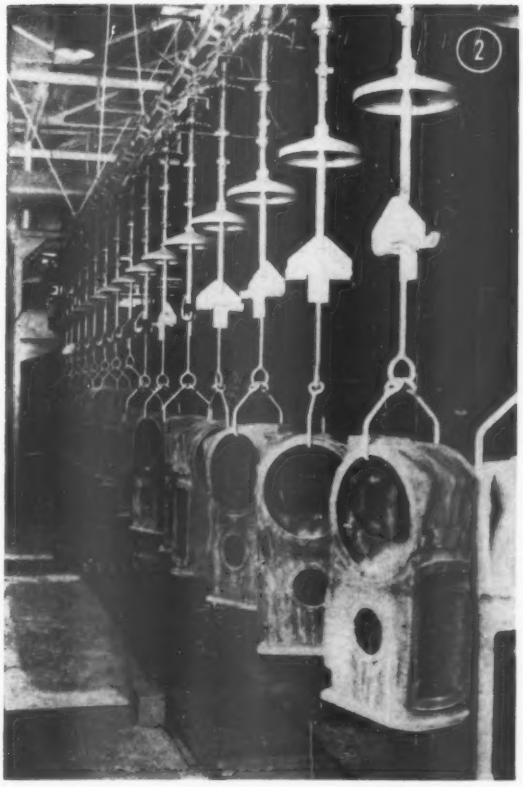
This flexibility is provided for by incorporating into the drive unit of each conveyor a gear box with a range of 13 speeds. The speed of the conveyors can be increased or decreased, but they are kept in correct ratio one to another by setting all the gear boxes to the same speed number.

From raw materials down the machine lines, through heat treatment, shotblasting, and other processes, to stores and then to subassembly and final assembly, the work is carried by a system of roller, overhead chains, monorail, and flat conveyors. At points where components or assemblies must be transferred from one conveyor to another, or to machining operations, mechanical lifting equipment has been installed. These lifts largely eliminate what is frequently the only remaining element of manual materials handling in conveyorized operation.

The three main buildings of the factory are shown in the diagram above. They comprise two machine shops, each 704 feet long and 250 feet wide. A third building of the same size houses the component stores department and the assembly shop. Total floor space is in excess of 1,000,000 square feet.

No. 1 machine shop is devoted to the production of gears, shafts, and other gear box and differential





components. Roller tracks at bench height run the length of the shop, alongside the machines. Work is passed along the track from machine to machine as each operation is completed, thus progressing from one end of the shop to the other.

After machining, components are transferred to monorail chain conveyors, one serving the washing and cyaniding department, and the other the carburizing and annealing department (identified in the diagram as conveyors 1 and 2).

Following inspection, finished parts are loaded onto conveyor 3. This conveyor, more than 3000 feet long, passes out of the shop, through No. 2 machine shop, and into the assembly shop. Here the components are deposited in the storage department, from which they are issued by means of another overhead conveyor to the subassembly and final assembly lines.

A similar system of chain and roller track conveyors is installed in No. 2 machine shop, which is divided into two sections, one for machining castings, the other for production of small parts on capstans and bar automatics. Conveyors 4 and 5 in this shop carry components through shotblast and prime-dip departments, respectively. Conveyor 6 carries finished parts from No. 2 machine shop to the storage department in the assembly building. This conveyor traverses the shop twice, across the end of each machine section. It is equipped with hangers and trays, arranged alternately, to accommodate castings and small parts.

In the assembly building, mechanical conveying has been developed to a high degree. Many types of conveyors are installed, including monorail and twin-rail overhead chain conveyors, wood and steel slat conveyors, gravity roller conveyors, and drag-chain conveyors.

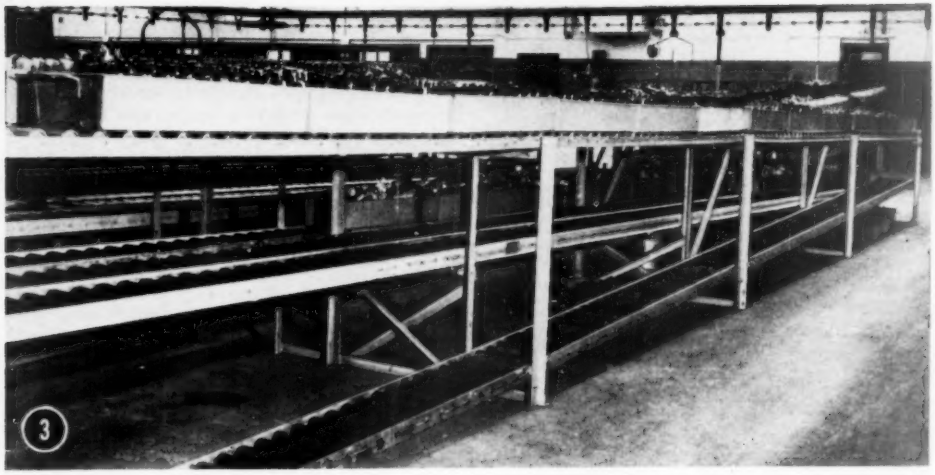
The interrelation of the conveyors feeding into the assembly building, and of the conveyors wholly within the assembly unit, can be seen in the photographs on this page and on the pages that follow.

1. In the machine shop, roller tracks at bench height run the length of the building alongside each line of machines. Work is passed along the track from machine to machine as each operation is completed.

2. Castings are transported through the shotblast unit by an overhead conveyor, fitted with special spindles carrying the hook on which the castings are hung. The spindles are free to revolve and have sprockets fitted at their upper ends. A roller chain, running parallel to the conveyor rail, engages the sprockets as the work passes through an automatic shotblasting cabinet, causing the castings to revolve and insuring that all faces are subjected to the stream of shot.

A universal joint in each spindle insures that the loaded hooks hang vertically at all points where the conveyor track rises or falls, irrespective of the position at which the castings come to rest after passing through the shotblast.

Movement of the castings before they are suspended on the conveyor is facilitated by a roller track on the floor. For loading and unloading the conveyor, sections of the floor roller track are mounted on pneumatic rams, hung under the floor and controlled by a foot lever. The conveyor is kept in continuous motion, and the ram provides a quick



and effortless method of raising the casting to a convenient height for hooking onto the conveyor, or for raising the casting clear of the conveyor hook and lowering it to the floor level.

3. Main storage racks for finished components arriving from the machine shop are centrally located in the assembly building. Small parts arrive in tote pans on roller tracks which slope toward the center aisle. Here they are loaded on the conveyor serving the subassembly section. Below the incoming conveyor may be seen a roller track sloping in the opposite direction, which provides for return of the empty work trays. This arrangement insures removal of parts from the rack in the order of placement. In this way, provision is made for removal of each part or unit from storage within 24 hours. At the same time, handling is reduced to a minimum.

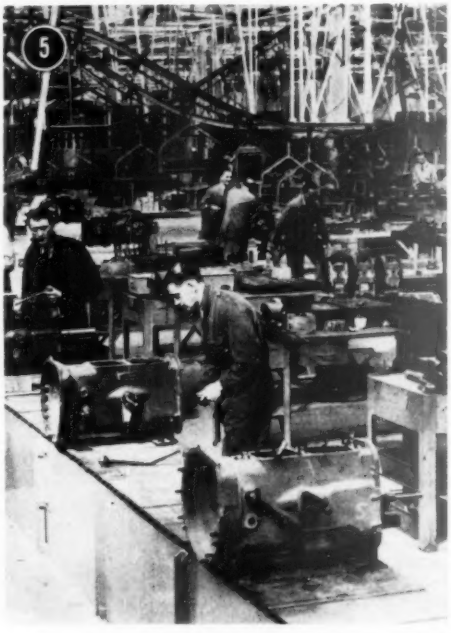
4. The main monorail chain conveyor which feeds the assembly line is loaded from the storage rack at the center aisle. A complete set of parts required for one tractor occupies 22 hooks or clevises. Clevises are numbered from 1 to 22, and corresponding numbers on the rack indicate which components are to be placed on each of the hooks or trays of the conveyor, so that they arrive at assembly in the correct sequence.

Many of the hooks are specially designed to take the particular part for which they are intended. Some are rubber-covered to prevent damage to finished surfaces. All are designed so that the components, often of a bulky and awkward shape, are held firmly and safely.

The length of the conveyor is planned so that the number of hooks it accommodates is always an even multiple of 73 feet, 4 inches, the distance occupied by 22 hooks or one complete set of parts.

5. The main assembly track is a steel flat conveyor with cradles bolted to it at 8-ft. intervals. Tractors are assembled crosswise to the conveyor to enable engine and front-end subassemblies to be mounted from one side, while rear-end subassemblies are mounted from the other side.

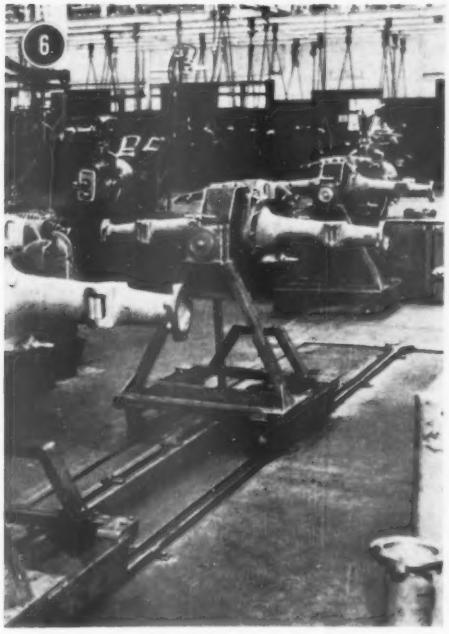
6. The conveyor for the rear axle subassembly is of the floor chain type. The subassemblies are built on a wheeled cradle which is dragged along by dogs on the chain. These cradles are arranged so that completed subassemblies are at the correct height to permit the rear axle to be bolted to the unit on the main track while still in position on the

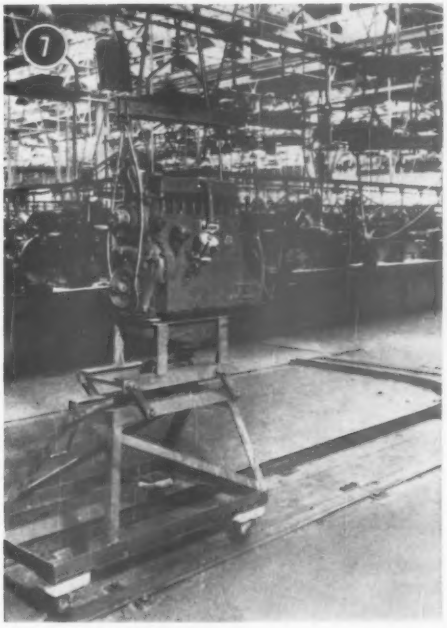


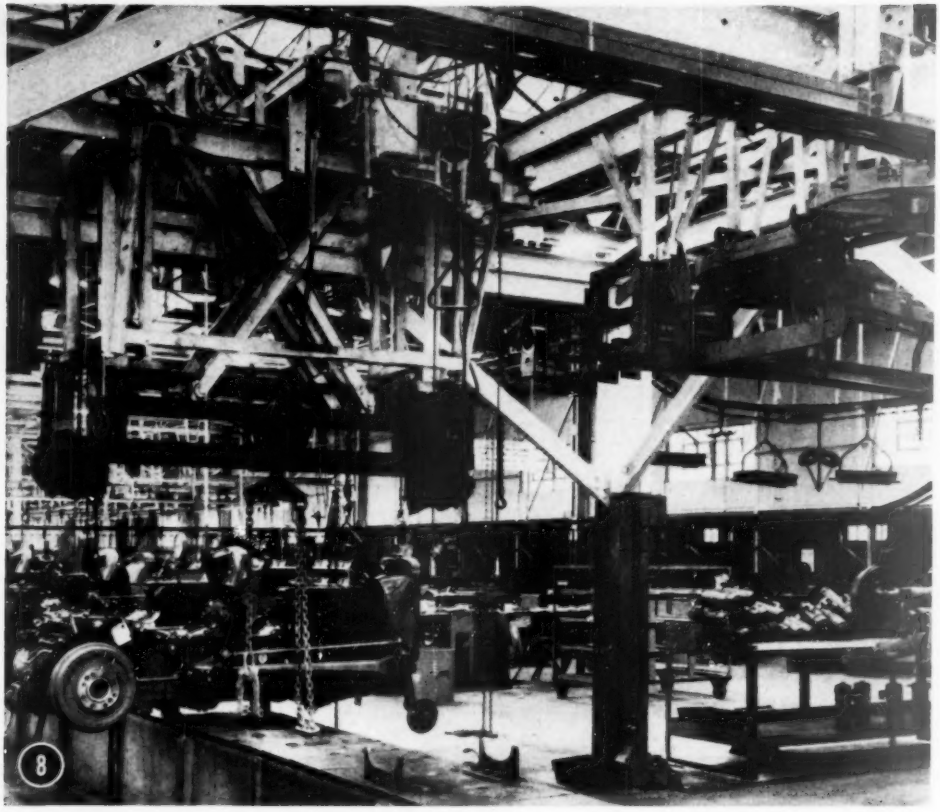
cradle. The floor conveyor follows a U-shaped path, the arm pointing toward the main track. At the end of the conveyor, the cradle is freed from the chain, pushed into place beside the unit being assembled on the main track, and moves with it while the rear axle is bolted on.

At this point, the wheeled cradle is released and returned to the other arm of the drag chain conveyor, on the merry-go-round principle, so that another subassembly can be built up on it.

7. Transfer of the engines from the conveyor on which they have been outfitted to the assembly track is accomplished by means of trolleys equipped with lifting gear. The lifting portion of the trolley is in the form of a cradle, into which the sump casing of the engine fits. Operating the lifting-gear handle raises the engine clear of the slings suspending it on the conveyor. When free, the trolley with the engine is pushed to the adjacent assembly track. The guide rail on the floor leads the trolley to the correct as-







sembly station, where the lifting gear serves to align the engine to the transmission casing on which it is to be mounted.

8. A power-operated drop section transfers the tractor from the end of the assembly line to an overhead twin-rail conveyor. At the point where the overhead conveyor crosses the assembly track, the chain rail bypasses the load rail, leaving a dead section. Empty trolleys are left on this dead section ready to be pulled forward onto the rail of the drop section, which can then be lowered through an electrically driven screw-and-scissor mechanism. This practice allows grappling hooks to be attached to the tractor. Limit switches prevent the drop section from being operated until the trolley is central on its rail, thus avoiding possibility of an unequal distribution of the load.

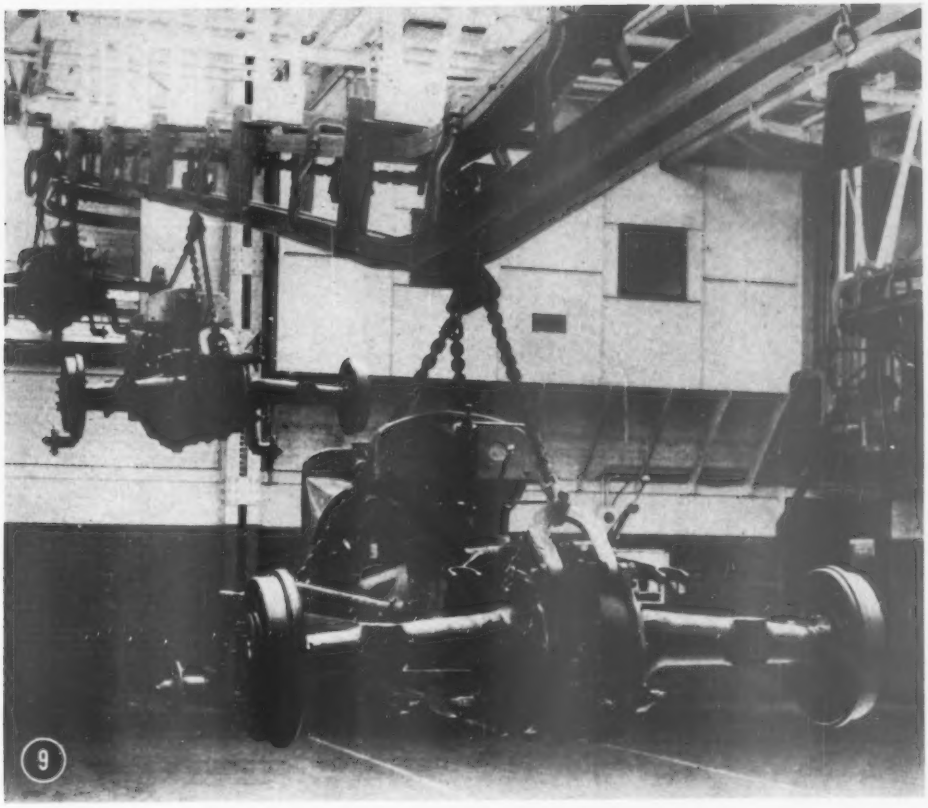
The drop section is provided with a travel of 4 feet in a direction in line with the assembly track. The end of the dead section and the beginning of the live section on the other side of the track are offset by this distance. The drop section can thus move for a limited distance with the tractor on the assembly line, allowing time for the lifting chain to be attached.

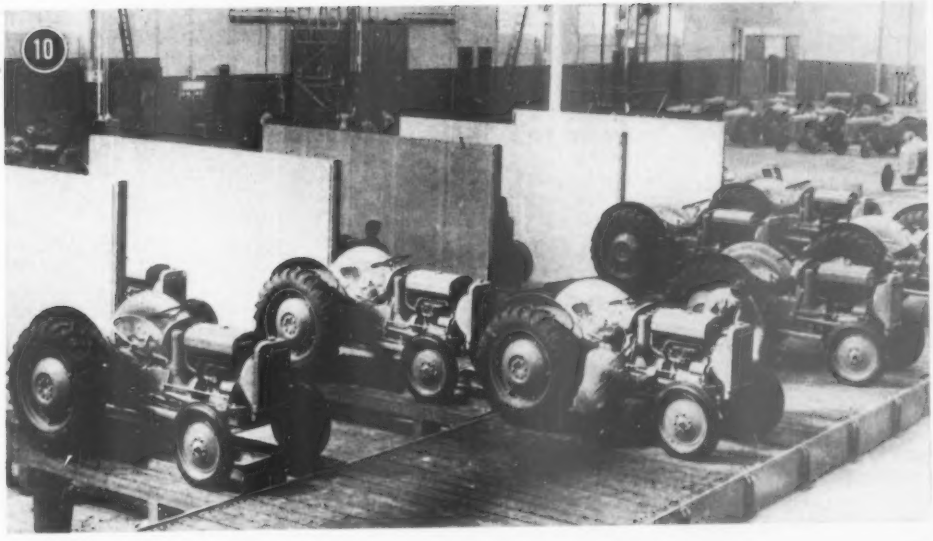
9. When the drop section is raised, the trolley is pulled onto the live section, where it is picked up by the pawls on the chain and is carried with its load toward the paint department. The spray booths in the paint department are staggered, permitting one side of the tractor to be painted as it passes through the first booth and the other side as it passes through the second booth. From the spray booths, the tractors are carried by the conveyor through a drying oven, then back to the final assembly line, to which they are transferred by means of a second drop section.

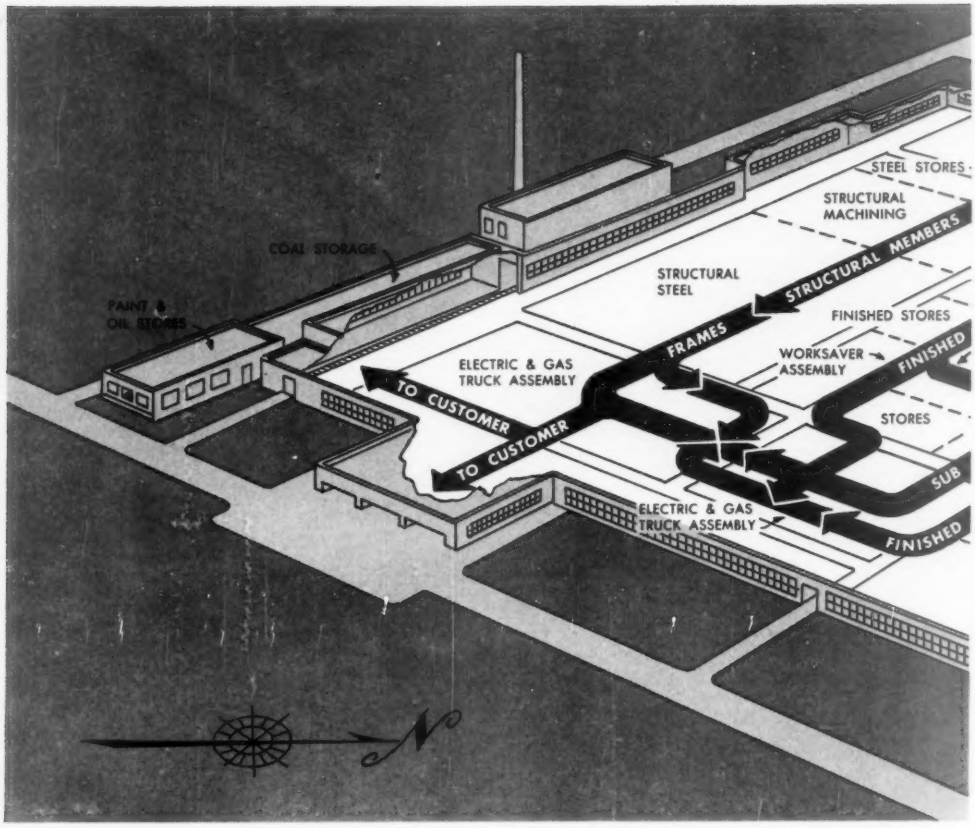
10. Final adjustments on the completed tractors are made on a wooden slat conveyor after the tractors leave the booths where the engine and hydraulic gear are tested. Upon reaching the end of this conveyor, the tractors are ready to be driven away for delivery.

* * *

This completely new layout, incorporating the most up-to-date methods of production, assembly, and materials handling, has permitted Standard Motors to approach closely, if not to achieve, the unique condition of "receiving to shipping with manual handling completely eliminated."


9


10



FLOW DIAGRAM SUPERIMPOSED ON LAYOUT OF YALE PLANT SHOWS MOVEMENT OF GAS AND ELECTRIC TRUCK PARTS

11·YALE & TOWNE MFG. COMPANY

Built new plant around handling problem. Laid it out to meet basic requirements of low-cost handling. Big savings will offset high construction costs

Low-cost handling was a natural goal when a manufacturer of handling equipment—Yale & Towne—planned its new Philadelphia plant.

The preliminary layout was made even before the site was selected. The building was constructed around the layout. The aim was to locate proper equipment engineered to correct procedure—at the right shop—to enable manufacture of production units in the most efficient manner—in the shortest time possible—over a minimum distance.

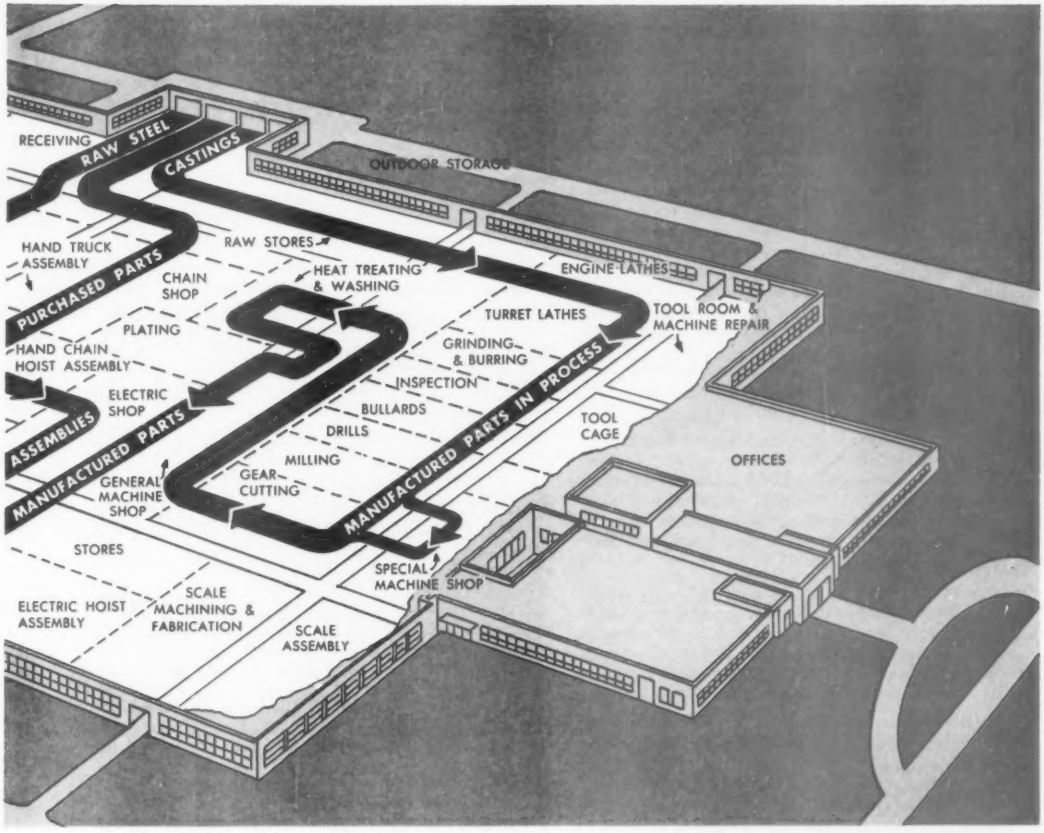
Relative positions of the departments were established after analysis of flow.

Based on the Yale conviction that production is material on the move, the layout meets eight fundamental requirements:

1. Adequate facilities to receive, inspect, and distribute incoming materials.

2. Short, direct routes to and from principal raw stores and processing areas to provide fast, efficient movement and storage of material.

3. Proper arrangement of machinery and equipment in each department to provide ample room to place material within easy reach of workers.



THERE ARE SIX SEPARATE ASSEMBLY DEPARTMENTS, ALL LOCATED WITH A VIEW TO IMPROVED FLOW OF MATERIALS

4. Free access to machines and assembly benches for quick delivery of materials in each department and fast pick-up of outgoing materials and waste.

5. Grouping of machines in departments so that movements between operations are as short as possible, with a minimum of backtracking.

6. Adequate storage for materials in process.

7. Stockrooms and tool cages with facilities to receive, store, inventory, and disburse parts and tools with minimum handling and effort.

8. Facilities to pack or crate finished products efficiently and ship by all classes of carriers.

At each step in the layout, manufacturing and handling methods were developed concurrently. Every work station was planned in proper relation to the preceding and succeeding operations. Thus, when the plan was completed, the basic materials handling system had also been established.

The basic layout provides for an eventual increase of 35 per cent in productive capacity. It is flexible enough to permit volume fluctuations in all lines.

The general rearrangement of departments is planned to improve the flow of work. One typical part now has 22 operations and has moved 45 times, a total distance of 10,140 feet. In the new plant the same part will travel only 3380 feet, a saving of 67 per cent. Savings of 30 to 50 per cent in distance traveled are common.

Six Separate Assembly Areas

The layout diagram (above) shows six separate assembly departments, all fed by a variety of machining, fabrication, and subassembly departments. Flow from receiving to shipping is traced for one assembly department—electric and gas truck assembly.

Three basic types of materials are received—purchased finished parts, raw steel, and castings and forgings from which parts are machined.

Purchased parts come in by rail and truck, and are moved directly to stockrooms in assembly departments. Most material either arrives as a unit or is made into a unit load upon receipt.

CONTINUED ON NEXT PAGE

Incoming raw material goes into rough stores and to one of three departments for the first operation. That is why principal storage areas are bounded by the receiving department on one side, and the manufacturing departments on the other.

Bridge cranes handle raw steel, structural frames, unit assemblies, and export crates. Monorail hoists in all departments position and move material. Provision has been made for two floor-type continuous chain conveyors to move industrial trucks between assembly operations. Motorized hand-lift trucks and industrial trucks transport thousands of different parts in portable carriers and containers.

The general production plan calls for parts to be machined and fabricated in economic lots—usually equivalent to requirements for several months. This requires storage for finished parts and units before release to assembly departments.

Study resulted in a system that requires many different types of materials handling devices. They fall into three basic classifications:

1. *Portable carriers and containers to hold, carry, and confine material on the move, in process, and in storage.* Intended for material that cannot be handled mechanically by itself. Includes stacking skid bins in two sizes, plain and stacking skids, pallets, trailers, self-dumping bins, dollies, rack conveyors, and special-purpose work carriers.

2. *Mechanical equipment to move, lift, and stack material with or without the use of conveyors and containers.* Includes platform and fork trucks, several models of motorized hand-lift trucks, bridge cranes, an overhead monorail conveyor, two floor-type continuous chain conveyors, and monorail hoist installations.

3. *Stationary storage facilities to hold loose material, as well as loaded carriers and containers.* Comprises several types of sectional steel shelving for finished parts, tools, skeleton rods for finished loads, and miscellaneous racks.

All mechanical handling machinery was divided into two basic groups:

1. *Fixed equipment, such as bridge cranes, monorail hoists, and conveyors.* Designed to service specific areas, operations, or machines, this equipment will be operated by personnel in the department where it is installed. In some cases, one man has the full-time job of handling material with a particular piece of equipment; in other cases, any one of several men uses the equipment as required.

2. *Itinerant equipment, such as fork and platform trucks, motorized handlift trucks, and tractors.* Intended for general use throughout the plant, these machines are usually operated by personnel of the materials handling department.

The materials handling department thus controls operation of nearly all units and portable power equipment for movements within and between departments. This centralized responsibility provides a pool of trucks and experienced operators for assignment anywhere within the plant.

Materials handling department trucks and operators are allocated in the following manner:

1. Motorized hand-lift trucks are assigned to individual departments for movements within the department. Each operator works under the direction of the foreman of the department.

2. Industrial power trucks (fork trucks, lift platform trucks, and tractors) have one of four basic assignments: (1) To a single department for full-time operation within the department; (2) to a specific activity involving movement of material between designated departments; (3) to the truck circuit, a specific group that serves a certain number of departments; (4) "on call" for individual assignments by the truck dispatcher. These latter trucks are the "flying squad." They serve departments that normally require only occasional service. A call to the dispatcher brings a truck to move one or more loads, after which the trucker reports back to the dispatcher for his next call.

While all industrial trucks must have normal assignments for an indefinite period, the dispatcher can pull a truck from one assignment to help on another when loads pile up or an operator is absent.

LOW-COST PRODUCTION THROUGH EFFICIENT MATERIALS HANDLING WAS AIM IN PLANNING THIS NEW PLANT

Simple Handling Installations That Solved Specific Problems

In medium-sized and small plants. Here is proof that size has nothing to do with effective use of handling equipment

THE DUMORE COMPANY
Racine, Wis.

Palletizing sheet steel and unloading boxcars with a fork truck is saving Dumore $2500 a year.

Sheet steel was formerly unloaded by hand onto trailer trucks, each car requiring two handlers for 17 hours. Now two men unload a car in approximately one hour. The boxcars were formerly tied up for four or five days; now they are held only about one day, thus saving demurrage charges of $5 a day.

The fork truck also made possible an improved method of handling sheet metal scrap. Special cutters have been placed on all punch presses. When a container beside the press is filled with scrap it is carried by fork truck to the yard and dumped into the collector's container. Result: Higher price for scrap, no manual handling, and complete elimination of one special handler formerly assigned to the scrap handling job.

FERRO MACHINE & FOUNDRY CO., Cleveland

Two mills in which sand was mixed were located in different parts of the foundry, each about 300 feet from the point of use. Sand was delivered by wheelbarrow, requiring two shifts of five to six men.

The mills have now been placed side by side. Sand is discharged into boxes on a roller conveyor. A 4000-lb. industrial truck, with a special dumping mechanism, picks up a box of sand, carries it to the point of use, dumps it, and returns the empty box to the mills. The operation is so important that a second truck has been bought for standby purposes.

Net result is that two men and a truck are doing the work of five or six men wheeling barrows. Less sand is spilled, and precious floor space formerly taken up by wheelbarrows has been reclaimed.

SANGAMO ELECTRIC CO.
Springfield, Ill.

Manual materials handling methods for receiving and warehousing sheet steel threatened to become an expensive bottleneck when production was increased to twice the prewar rate. The solution was an overhead tramrail carrier, with "pan" attachment, for handling the 34x121-in. sheets of steel.

The tramrail carrier has reduced worker fatigue and accidents, and has also cut the labor required to unload and warehouse each 70,000-lb. carload of sheet from 32 to 20 man-hours.

CONTINUED ON NEXT PAGE

PHIL R. HINKLEY CO.
Cleveland

Small parts for outdoor lanterns and lighting equipment called for considerable lay-down space at finishing operations. Area available was only 2000 square feet and could not be stretched to keep up with fabricating departments.

Answer was to install an overhead conveyor with carriers on 18-in. centers. The conveyor carries parts from a hot water rinse, up through an 8-ft. drying oven, down through a paint booth on the production floor, up through a 26-ft. infra-red oven, and back to the unloading points.

Lay-down space is no longer necessary ahead of cleaning and painting or for drying. Space saved under the infra-red oven is now occupied by a second oven used for special small-oven parts. Finishing space has actually been cut 25 per cent and production is up 50 per cent.

•

S. E. MIGHTON COMPANY
Bedford, Ohio

Warehousing space for both raw and finished products (canned meats) was inadequate. Two new fork trucks—one 4000-lb. truck with 8-ft. lift and a 4200-lb. truck with 12-ft. lift—have made it possible to palletize. Storage capacity has been trebled. The handling of incoming and outgoing shipments, amounting to 100,000 pounds per day, has been speeded up. And the trucks have had time left over to do such other jobs as moving production equipment or assisting in setting in a new boiler.

TRI-CLOVER MACHINE CO.
Kenosha, Wis.

A simple rearrangement of bins has resulted in a 30 per cent increase in materials handling efficiency at Tri-Clover. The standard before the improvement was 38.5 pounds per man-hour; it is now 50 pounds per man-hour.

Previously, no part was assigned to any special place, with the consequence that it was sometimes necessary to walk as much as 100 feet to reach a frequently required item. On the other hand, a part called for only once or twice a day might be within 10 feet or less.

Uniform bins, carefully designated to place the most popular parts closest to the shipping tables, now insure that that distance to the item is always in inverse ratio to its frequency of use. A door through a partition was the only alteration required.

•

UARCO, INC.
Chicago

Waste of overhead space in the storeroom was apparent with the old method of stocking. It was also apparent that the time and effort required to remove stored boxes from the centers of tall stacks would offset any savings in floor space.

The solution was to erect 88 steel frame racks, each capable of supporting a 1-ton skid load. The frames are set back-to-back in lines separated by 7-ft. aisles. More than 70 different items, of which 37 comprise one skid load or less, can be individually removed from racks or from the floor beneath the racks without disturbing other skids.

A portable elevator, which provides maximum maneuverability, made possible the relatively narrow aisles. The net result is a reduction of 38 per cent in the floor area required for storage and a saving in floor space alone of more than $2700 per year.

GRIFFITH LABORATORIES
Chicago

Two hundred and sixteen 100-lb. bags of salt are required daily for a special mixing process. The bags have to be moved from receiving to storage, then from storage to processing. In the past, this was done by hand truck, 6 bags per trip. The result was 72 moves per day—36 to storage, 36 to process. Two or three men were required to do the stacking.

A simpler method was found in the use of a hand-operated, motor-driven, low-lift fork truck. By palletizing the bags it became possible to move 24 per trip, thereby cutting the daily total from 72 to 18 trips. Additional advantages are found in the fact that only one stacker is required instead of three, and losses from bags torn in handling have been markedly reduced.

KEYSTONE STEEL & WIRE CO., Peoria, Ill.

Use of a floor-level conveyor and electric hoist trucks serving a central loading point has halved required floor area in the barbed wire department.

Prior to the installation, machine operators stacked completed reels of barbed wire near their machines. The wire was thus a constant danger until truckers rolled away the reels, often calling on the operators for help. The reels were stacked by hand to a height of 4 feet; then handlers would climb on the reels and repeat the performance three times.

Now the machines are located in rows beside the electrically powered floor conveyor. Operators simply roll completed reels a few inches onto the conveyor for delivery to the loading point. There, the hoist truck stacks to a height of 16 feet in one operation.

•

THE SCOTT & FETZGER CO.
Cleveland

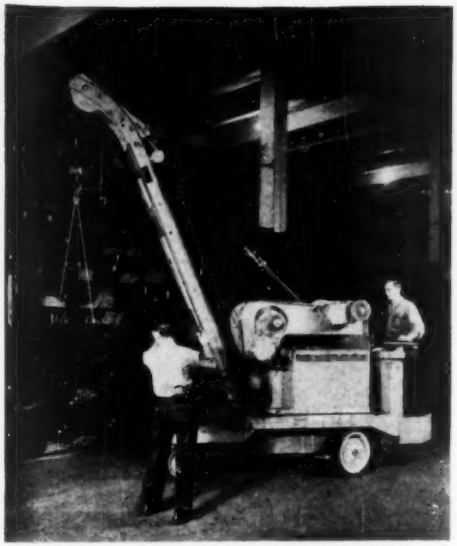
Old way to assemble vacuum cleaners was on a push-along basis. Then the company decided production had to be increased seven times.

First, building area was increased one-third. Next, two sections of aluminum-hinged, plate-type conveyor—65 and 100 feet long—were installed.

Now as each worker completes his operation, he merely pushes the assembly onto the conveyor for delivery to the next work station.

The present operation requires more workers. But, while production has been increased seven times, man-hours are up only four times, which is equivalent to a reduction of 40 per cent in man-hours per unit.

CONTINUED ON NEXT PAGE



JOSEPH T. RYERSON SONS
Cleveland

Unload sheet stock, bar stock, and pipe from boxcars. Stock it in special racks. Load it on trucks for delivery to plants. Even with a lift truck, much manual handling was required.

To correct the situation, the company purchased a 2-ton, crane-type, swivel-mounted industrial power truck, which is used to unload material from boxcars to a point where it can be handled by overhead crane. The truck is also versatile when it comes to placing material in the racks (as shown) and on delivery trucks.

Handling costs have been cut by 30 per cent (for light stock) to 75 per cent (for heavy stock).

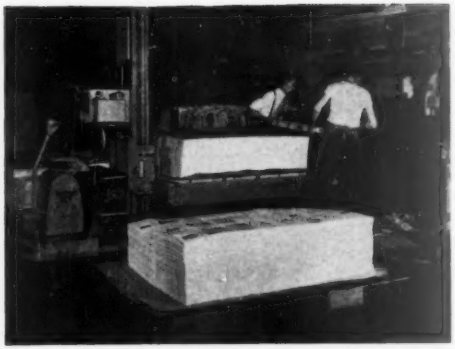
•

JOHN C. VIRDEN CO.
Cleveland

Many Virden products require multiple-press operations. Formerly it was necessary for each operator to have two toteboxes at his press, one for raw stock, the other for finished parts.

Inclined belt conveyors have now been installed between presses. When the first operation is completed, the part is ejected to a chute. It slides down the chute to the belt, which carries it up into a totebox at the second operation work level. And so on, through successive press operations.

The number of toteboxes required for pressroom work has been halved. Labor needed to move work from one press to the next has been eliminated. Press time has been increased because operators do not have to wait for parts.

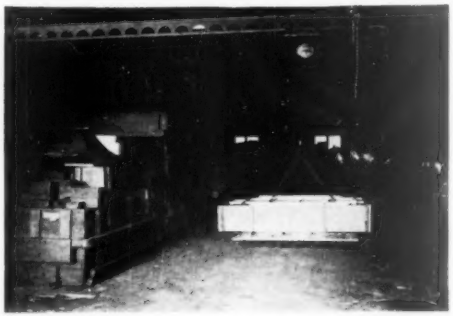


F. N. VOLKERT & CO.
Chicago

Manual moving of loads up to 5000 pounds in the bindery formerly required a towing crew of two to four men, often drawn from other duties for the purpose. Now one man can do these jobs with a hand-operated, motor-driven skid lift.

As a "dividend," when the lift is not being used for tiering, it can be employed in conjunction with the cutting machine. Carrying a skid load of paper, it is parked in front of the cutter. There it serves as a platform, always at proper operational level, for removing sheets without danger of strain.

•



DUPLEX FOUNDRY CO.
Elyria, Ohio

Wood patterns used by Duplex are big and bulky. They take up so much room that they are stored in a new Quonset-type warehouse. They are so heavy and difficult to handle that the warehouse operation would require the services of several men were it not for a 1-ton hand-propelled tramrail crane which has been installed. With the crane, which operates on a 30-ft. beam in the 40x200-ft. storage building, one man can easily handle the entire pattern storage operation.

SNAP-ON TOOLS CORP.
Kenosha, Wis.

An electric hoist is doing double duty in the burnishing room at Snap-on. Traveling on a cross-track the hoist is used to dump burnishing barrels into a caster-mounted floor truck and then to raise the truck so that burnished tools and abrasives may be spilled onto a screen for easy operation. The hoist also makes quick work of lifting and loading into barrels the 1500 pounds of tools plus abrasives and compounds.

With former manual methods, two or three men spent at least a half-hour in heavy lifting to accomplish what one man can now do in five minutes with the hoist.

•

WASMER BOLT & SCREW CORP., Cleveland

Bolts and screws produced in one plant are plated in another several hundred feet away. Parts, in kegs, are carried to the plating plant in truck loads of 25 kegs each. Previously, kegs were removed to a 2-wheel hand truck for the trip from the loading dock to the plating room. One of the plating operators did this job, and cycle time was 2½ hours for each load of 25 kegs.

Now a 30-ft. roller conveyor slopes from the dock to the plating room; a second slopes in the opposite direction for returning kegs to the dock. A hoist in the plating room lifts kegs to starting point of return conveyor. Cycle time for handling operations has been cut to 1½ hours, a reduction of 40 per cent, with the result that the plating operator involved can spend an additional hour per day on his plating duties.

H. M. HARPER COMPANY
Morton Grove, Ill.

Full utilization of relatively expensive equipment is sometimes a problem in small plants. Harper uses its fork trucks to haul heavy coils of wire from receiving docks to cold heading machines. By loading on the "ram" principle, as many as ten coils can be moved at once, quickly and efficiently.

The new method is much faster than with the flat trucks previously used, and the unloading problem is greatly simplified. Coils can be slipped off singly, or spotted as a group by lowering the forks and backing up the truck.

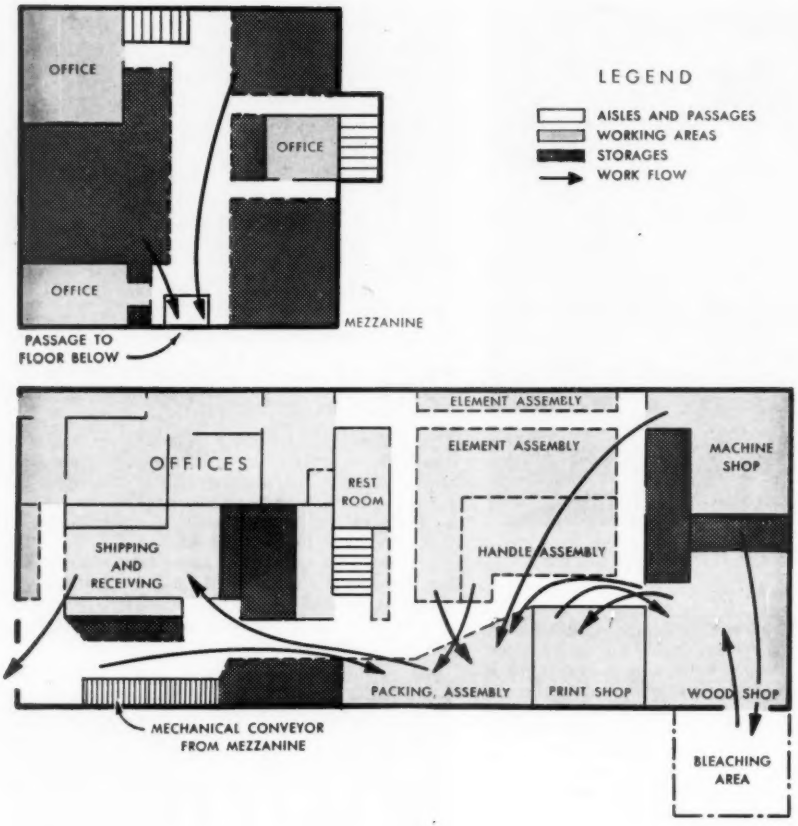
•

DAY-BRITE LIGHTING, INC.
St. Louis

Recently installed conveyorized spraying and drying operations have made it possible to handle the same quantity of materials with only half as many employees engaged in these operations.

Parts are put on the twin hooks of the overhead conveyor in their raw state and are not handled until they are removed for firing in the electric furnace. There are no slowdowns for handling since the brushing and wiping operations are completed while the parts are on the conveyor.

for cutting costs and increasing productivity



OLD LAYOUT INVOLVED MANY FLOW LINES, NUMEROUS CONFUSING CROSS-OVERS, AND WASTEFUL BACK-TRACKING

New Layout Cuts Floor Space,

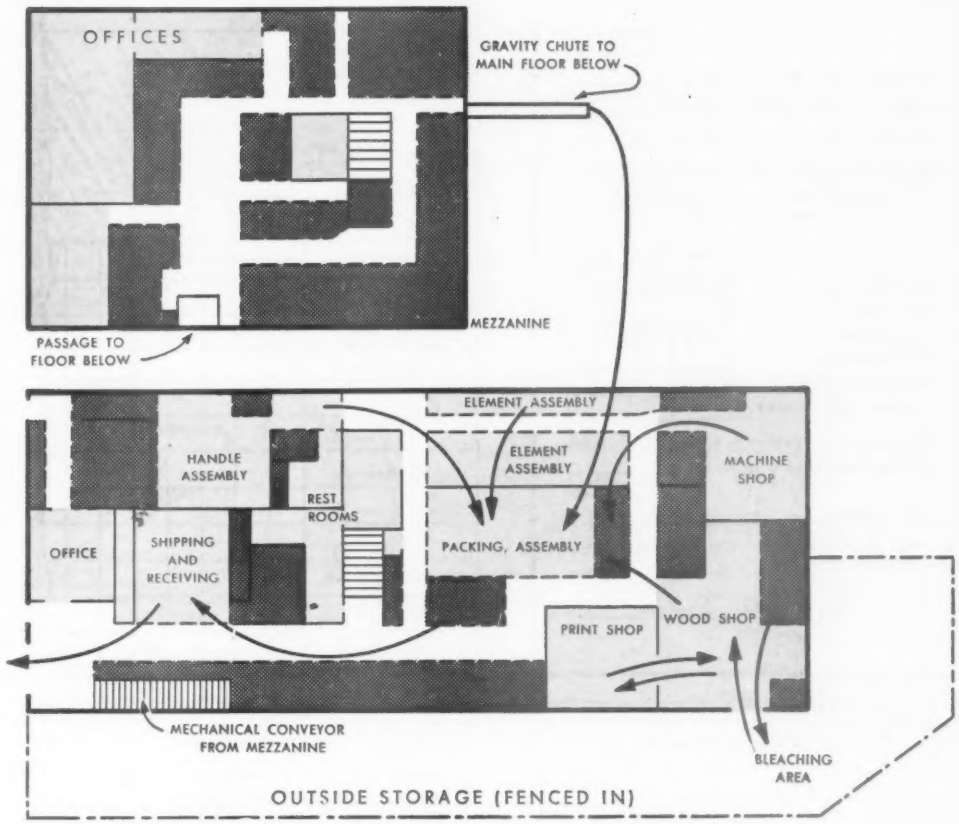
ALVIS R. KNOWLES • INDUSTRIAL ENGINEER, UNGAR ELECTRIC TOOL COMPANY, INC., LOS ANGELES

CAPACITY HAS BEEN TRIPLED while required floor area has been reduced by approximately 25 per cent at Ungar Electric Tools. And it was done without major building changes or additions.

Principal contributors to this increased efficiency were a relayout of the production facilities for woodburning sets (shown in the diagrams above) and pencil-type soldering irons, and improvements in the assembly and drying techniques for heating elements.

Except for a simple rearrangement of partitions, the only physical alterations involved extending the balcony or mezzanine 18 feet and relocating all but one small office on the mezzanine.

Relayout of the facilities in the various production centers resulted in shortened and simplified flow lines throughout the plant. Storage areas in the new set-up are far



NEW LAYOUT HAS FEWER FLOW LINES, FEWER CROSS-OVERS, LESS BACK-TRACKING, AND BETTER PLACED AISLES

Triples Capacity in Small Plant

more flexible (and, in most cases, closer to the point of use of the material). This arrangement makes it possible to allocate the correct amount of space as each shipment is received, and also eases the problem of scheduling incoming shipments.

Cost studies of the new operations have shown comparative savings in every production center. Although no marked decrease in the over-all cost of manufacturing has been noted, it is significant that the increases in both wage and material costs have *not* brought a corresponding increase in the over-all manufacturing cost.

In preparing for the changeover to the new layout, the old arrangement and many possible alternatives were studied through the use of simple three-dimensional block models of tables, machines, and materials handling devices. While not as elaborate as the three-dimensional scale models used by some companies, these block models offered better perspective and were easier to visualize than paper templets. At a purely nominal cost, the block models were more than adequate to the job.

DATE 3/31/48

MACHINE SIZE K Model

TODAY'S QUOTA 3850 sq. ft.

REMARKS

FLOOR MACHINE OPERATOR'S DAILY REPORT

	BAYS	SQ. FT.	TIME
Floor seal-cleaned	H-19/12 E-15	2196 1500	4 3
Floor sanded			
Floor bar-waxed	H-19/12 E-15	2196 1500	1
Floor brush-buffed			
Floor vacuum-cleaned			
Overhead vacuum-cleaned			

New steel wool rolls placed in machine 1-16" Roll

New wax bars placed in machine

Other work:	TIME

Signed: A. Dushl
Operator

1 FLOOR CLEANING COSTS are obtained from a daily report showing work done, labor hours spent, and quantities of materials used

TIME AND WORK DISTRIBUTION

DATE 3/31/48

EMPLOYEES	HR.	HR.	AMT.	AMT.	AMT.	HR.	HR.	H
	BUILDING Nos. 3 & 7	MEETING SET-UPS	FLOOR MACHINE-CLEANED	FLOOR BAR-WAXED	FLOOR BRUSH-BUFFED (TILE)	POWER TUBE SW	FLOOR	
Beck								
Bradley								
A. Doner								
B. Doner								
A. Dushl			3696	3696				
H. Houck								
C. Waugh								
C. McCoy								
W. Lefever	8							
T. St. Clair								
Mr Jones					6500			

2 DETAILED ANALYSIS of janitorial output is given by a daily summary of the various services rendered each department in the plant

3 PERFORMANCE VARIATION in janitorial costs can be quickly spotted in a monthly report for plant engineer and controller

Better Methods for Janitors Result From Cost Analysis

H. MASON • MANAGER OF BUILDINGS AND GROUNDS, RCA TUBE DEPARTMENT, LANCASTER, PA.

COST ANALYSIS and methods improvement studies have put a big dent into the cost of plant janitorial work at the RCA-Lancaster electron tube plant. And the top in savings still has not been reached.

Plant janitorial work can cost a heap of money. But is it all necessary? First step to finding this out is to get interested in whatever costs are available. Or at least make a rough estimate of labor and material expenditures. The results are startling, if all factors that should be, are included. And they inevitably lead to pencil sharpening.

That's what happened at RCA-Lancaster. The cleaning budget looked mysterious and high to the controller. He wanted more cost details. Also, operating supervisors felt they were not getting a fair share of janitorial services. With only lump-sum labor and material figures at hand, there was no way for the janitorial supervisor to justify the expense or refute the charge of maldistribution. So in self-defense he set up a program for accumulation of reliable costs that would give a complete breakdown of all major operations.

Three report forms were devised to give this breakdown of costs:

MONTHLY REPORT OF JANITOR SERVICES

DATE March, 1948

	Power Tube	Parts Mfg.	Cathode Ray	Eng. Lab.	Photo Tube	Employees Services Offices	Rec. and Whse.	TOTAL
	HR.	HR.	HR.	HR.	HR.	HR.	HR.	HR.
BUILDINGS Nos. 3 & 7				160				160
MEETING SET-UPS				14		20		34
SWEEPING	160	144	177	189	18	341	87	1,116
FLOOR MACHINE-CLEANED	78.5	86	106	44	30	56		400.5
WALLS & PARTS CLEANED	6	3		5	36	11		61
TOILET CARE	157	138	160	158		285	36	934
SETTLING ROOM			152					152
OVERHEAD CLEANED	12				24.5			36.5
LIGHTS CLEANED	27.5				20			47.5
CHEM. REFUSE DISPOSAL	2	2	2	2	2	2	2	14
REFUSE DISPOSAL	14	14	16	14	14	14	14	100
REFUSE PICK-UP	41	41	45	30	25	29	37	248
PAPER BALING	20	20	20	20	4.5	20	20	124.5
VEND. MACH. SUPPLY DEL.	4	4	5	4	0	4	4	25
ROOF REPAIRS	1	1	1	1	0	1	0	5
GENERAL LABOR	12	12	12	12	8	12	12	80
SNOW REMOVAL	15	15	15	15	8.75	15	15	98.75
TOTAL	549	480	711	668	190.75	710	227	3,636.75

Floor area machine cleaned - 100,614 sq. ft. (3,469 sq. ft. per 8-inch steel wool)
" " bar-waxed - 98,328 sq. ft.
" " brush-buffed - 100,430 sq. ft.

Steel wool used - 20 8-inch rolls, 9 16-inch rolls

Refuse paper sold - 10,665 lbs.
" cardboard - 20,168 lbs.
" rags - 786 lbs.

Paper towels used:
Men - 450 pkgs.
Women - 600 pkgs.

(1) Floor-machine operator's daily report; (2) daily time and work distribution of all janitorial labor-hours, which also is used for a monthly summary; and (3) monthly report of janitor services. Their applications will now be described.

1. **Floor-machine operator's daily report.** About nine-tenths of the plant floor area of 400,000 square feet is composed of maple sectional flooring laid in mastic. The balance is asphalt tile. It requires a crew of three men using various large and small floor machines to keep these floors clean. Plant processes do not tolerate dust anywhere.

The floor-machine crew works under daily assignment from the foreman because layout changes and special conditions make regular scheduling impracticable. For all janitorial assignments the plant is described in bays, instead of departments, because boundaries change frequently.

Using the daily report shown in Figure 1, the foreman can keep a detailed record of the performance of his floor-machine crew. In substance it shows labor-hours and material expended for so many square feet of work done. Any other work is also accounted for. The foreman knows from experience and previous record what constitutes a fair day's work. He can test competitive cleaning materials with an accurate knowledge of results. These are the facts, easily furnished, which give control.

CONTINUED ON NEXT PAGE

2. **Daily time and work distribution.** A record of what every janitorial employee is doing each day is needed to control these activities. Such a record is provided by the form shown in part in Figure 2. Each employee is listed in the outside left column.

This record gives a detailed analysis of all operations for a staff of about 23 people. It covers the work of three floor-machine men, seven area cleaners, seven washroom men and women, two refuse-disposal men, one paper baler, one gardener, and two laborers. The analysis sheet is of double-page width to accommodate 46 vertical columns. There are nine major column divisions, one for general floor-machine statistics, seven for work done in seven major area divisions, and one for miscellaneous overall functions such as waste disposal, paper baling, and overhead cleaning. Each area division is subdivided for hours expended in sweeping, floor-machine cleaning, cleaning of walls and partitions, and washroom care. At the extreme right is a total-hours' column (usually 8 hours) for each employee.

The vertical columns are totaled at the bottom of the sheet and these totals (hours only) are cross-checked with the total of the last column. In the lower left corner an entry is made of the amounts of paper, cardboard, and rags salvaged and sold by the paper baler.

Monthly time and work distribution (not shown). This record is but a compilation of the daily summary. The daily totals are posted to this summary across the sheet, using one horizontal line for each day. Monthly totals are calculated in the same way as daily totals.

3. **Monthly report of janitorial services.** A more condensed report is prepared monthly for management—specifically, the plant engineer and the controller.

This report, shown in Figure 3, distributes the total labor hours from the monthly summary over the seven major area divisions. Other interesting statistics, such as total consumption of steel wool, and amount of paper sold, are developed from primary reports.

In all these reports dollars and cents do not appear. This refinement would take considerably more time for reports, and is unnecessary for an accurate interpretation of performance. In fact, costs are more easily controlled when performance is stated in units of worker effort and material consumption.

Detailed daily and monthly reports such as these are bound to provoke analysis, comparison, discovery of inefficiencies, and a search for further economies. Complementing the development of cost analysis, methods improvement studies are being made continually of all janitorial operations. The cost analysis then serves to check the amount of improvement.

Early in the game it was felt that area men were walking too great distances. Elementary time and motion studies of their working habits were made to get minimum travel and maximum work. It took about one week to study each area. As a result, charts were drawn up for each area man showing what areas he should service each day. Whereas the area man felt before that he had too much work to do, now he is able to do a better job, and is pleased with the results.

Reaching Overhead Pipes

Cleaning overhead ceilings and pipes was a problem. It was solved by the design of a special platform hoist which was attached to the portable vacuum cleaner. The platform can be raised 15 feet above the floor, or level with the bottom of the roof trusses. Two men are now able to handle the one unit, which has simplified use of the vacuum hoseline. Cost of the job was slashed more than 80 per cent from the bid of an outside contractor.

Methods studies solved a vexing floor problem. A process operation in one area causes smudgy carbon dirt to fall on the floor. These droppings could not be eliminated. Workers ground the dirt into their shoes and tracked it elsewhere. Constant cleaning by an area man was expensive, yet dust cannot be tolerated in this plant. By provision of light expanded-metal mats, the problem was solved. Now the dirt falls right through them to the floor. The mats are taken up periodically to clean spots stained by spillage. The floor is easily cleaned each night by sucking the loose dirt through the mat with a vacuum cleaner. Taking a cue from this, rope-link mats have been laid in other parts of the plant, near entrances, etc., to remove undersole dirt and dust.

Every Month . . .

AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 152) . . . a summary of **LABOR DEVELOPMENTS** (page 232) . . . things **YOU WANT TO KNOW** more about (page 224)

Soap Cost Cut

Cleanliness is next to godliness, but in its promotion the washroom soap bill used to run over $1400 per year. Soap was formerly bought as a 15 per cent solution. Any attempt to buy cheaper concentrated liquid soap was balked by the trouble caused by emulsification when it was diluted. This was so until distilled water was tried. Now the annual soap bill is about $360.

Substitution of a gravity tank soap system for individual bowl containers in the washrooms saved some more money. It saved soap because of less waste, it cut refilling time, and eliminated damage from abuse of non-functioning equipment.

Methods Studies

Other techniques of minor status, nevertheless contributing to greater efficiency and lower cost of janitorial work, were born of methods improvement studies. A special clear varnish was adopted for all washroom tile floors which makes mopping a much easier job. Resurfacing is needed only about every six months. Cleaning of fluorescent lights (over 14,000 fixtures) was simplified by use of a portable elevator hoist. Cleaning of wood floors was simplified by use of a non-slip bar wax, instead of a solvent wax, which permitted operators to walk over waxed areas before they were polished without harming the floor surface. Floor-machine men were provided with two-wheeled carts to carry all accessories and supplies right to the work area.

Best evaluation of the effectiveness of a cost-conscious approach to all janitorial problems is the fact that a total staff of only 25 people is keeping a plant of this size and character spotlessly clean.

15 Ways to Cut Cost of Gas Fuel

EFFICIENT USE OF GAS FUEL is easy to attain. It requires merely the careful and consistent observance of a few simple principles.

Industrial plants in many localities use manufactured gas; in others, natural gas is used; in still others, the supply is a mixture of both. Regardless of the kind of gas used, the principles involved in the efficient operation of gas-fired equipment are the same.

1. Maintain Gas-Fired Equipment in First-Class Operating Condition

When gas-fired equipment is delivered new, it usually is checked by a manufacturer's representative, adjustments are made, and it is otherwise put in first-class operating condition for the particular job. Keep it that way. Like any other mechanism, gas heating equipment cannot function efficiently unless it is properly maintained. Follow manufacturer's instructions as to maintenance attention needed.

2. Adjust Gas Burners Correctly

The gas supply varies in different parts of the country. There is a variation between similar gases in such properties as B.t.u. value, specific gravity, pressure, and chemical content. Therefore it is advisable to have the adjustment of the burners checked by a competent gas engineer. This usually is done for the asking by an engineer from the local gas company. He is best qualified to do such work, since he is thoroughly conversant with the characteristics of the gas that is supplied locally.

3. Keep Premixed Gas Equipment in Order

To secure certain desired results it is necessary in many instances to prepare a mixture of gas and air before it goes to the burners, instead of using burners that do their own mixing by using the velocity of the gas to draw in sufficient air. These premixing machines are critical in their operation and must be properly adjusted to give the desired high-intensity flame characteristics.

Here again the local gas company engineer will give invaluable help in supervising the proper adjustment of sensitive equipment and adapting the heat supply to its purpose.

4. Instruct Operators Thoroughly

The best equipment made, can be ruined quickly through mishandling by inexperienced operators. Those charged with the use of gas-operated equipment should be thoroughly instructed in its use, told what is being done to the particular product being processed, and what the ultimate results should be.

5. Use Automatic Temperature Controls

Completely automatic temperature controls are a means of providing uniform temperatures for processing. They prevent overheating and underheating, and commonly operate within very small plus or minus changes.

When manual controls are used, the operators have a tendency to push up the temperature to speed the process. It is wise to eliminate all possibility of such an action. It may result in spoiling the work, and excessive heat may burn out the furnace linings.

Automatic temperature equipment must be kept in good order at all times. Unless the maintenance or other personnel are thoroughly familiar with such equipment, they should not attempt to make any adjustments or repairs. Call in the manufacturer's serviceman.

Do not let unskilled persons tinker with this sensitive equipment.

6. Analyze the Flue Gases

One of the best indications of operating efficiency of industrial gas-fired equipment is an analysis of the flue gas. The temperature and flue gas analysis will indicate immediately whether proper combustion is taking place, or whether there are air leaks in the equipment.

If there is any difficulty with the processing operation that cannot easily be attributed to obvious causes, have the flue gases analyzed and do what is recommended to correct the faulty condition.

This should be done periodically anyway, as a check on the efficiency of the gas equipment.

7. Check Furnace Linings, Hearths, and Brickwork

Make a periodic check of furnace linings, hearths, brickwork and all ceramic parts of a furnace. Cracked or displaced ceramics will reduce efficiency.

Keeping these parts in good repair will do much to assure satisfactory and uniform production, and save gas and money.

8. Stop Leaks in Equipment

Gas-fired industrial processing equipment has the necessary and proper amount of insulation built into it. If through damage or for other reasons heat is permitted to escape at places where it is not supposed to, efficiency of the equipment may be reduced considerably, resulting in lost time and money.

9. Avoid Overloading Equipment

Industrial gas equipment is built to do a specified job in handling a specified maximum production load. For the most economical operation, use it at the full rated capacity. If equipment is overloaded, efficiency will drop. When it is underloaded the cost goes up.

Do not try to make equipment do a job it was not designed to do. It is more economical to purchase a machine to do exactly what is wanted.

10. Keep Equipment Up to Date

Review purchase date of all equipment periodically, to determine whether it is outmoded, in the light of replacing it with new, improved equipment.

Replacing obsolete equipment with new may result in a material increase in production, and improved product with a consequent lower unit cost.

11. See That Safety Equipment Works Properly

If the equipment is provided with safety controls, see that they are working properly, and insist that they be used. Too many times safety equipment is bypassed to save a little time or make it a little easier for someone. Operators may get away with this for a while, but sooner or later something will happen.

Safety equipment is designed and installed to do a specific job—to make operation safe. Do not let anyone take safety measures or equipment lightly.

If the gas-using equipment has no safety equipment —GET IT. It may be the means of saving a machine, a building, or a life.

12. Keep Prepared-Atmosphere Furnaces in A-1 Condition

Prepared-atmosphere furnaces, a highly specialized type used extensively in the metalworking field, must be kept in perfect working order.

The manufacturers of the equipment have no doubt supplied a complete set of procedures for operation. Review these directions with the operators to see that they know exactly what they are doing. There are only certain ways in which atmospheres may be introduced safely into a furnace. There are practically no exceptions to the rule for admitting a special, prepared atmosphere to an air-filled furnace, which requires that the furnace temperature be not less than 1400 deg. F. before admitting the atmosphere. This precaution is necessary so that the atmosphere will ignite immediately on entering the furnace. If unburned atmosphere is allowed to accumulate in an air-filled furnace, disastrous results may occur.

Be sure the operators know how to do their jobs.

13. Do Not Waste Gas

When equipment is not in use, turn the gas off. If the equipment and process are such that it is impracticable to turn gas off and let the equipment cool, keep it warm at the "maintaining rate" recommended.

14. Save Heat When Equipment Is Not in Use

With pots, baths, and melting equipment that are not in use, heat may be conserved by keeping these items covered. By so doing, less gas will be necessary to keep them at holding temperature.

15. Set Thermostats at the Desired Temperature

If a certain temperature is required for a processing operation, set the thermostat at that temperature. Maximum gas flow will automatically bring the temperature to the desired point; then the thermostat will keep it there. It is unnecessary to have a higher setting to bring up the heat more quickly.

PRETTY AND COMFORTABLE are the uniforms worn by women workers at Bayuk. They can be obtained in any of four pastel shades—green, mimosa, peach, and gray—to suit any taste or complexion

Why Our Girls Really Like Their Uniforms

MORRIS L. WURMAN • VICE-PRESIDENT AND GENERAL MANAGER
BAYUK CIGARS, INC., PHILADELPHIA

WOMEN LIKE TO LOOK their best, even at work. Stylish work clothes for women can influence production. Thus reasoned management at Bayuk.

Put another way, the daughters of Eve are all alike—they prefer attractive colors and stylish fit even with work clothes. Dress them becomingly and they look better, feel better, and work better.

So we arranged with a textile supplier to design a new type of garment. We decided every girl in our plant, whether blonde, brunette, or red-head, ought to be able to select a dress color that appealed to her. We did away with standardized work uniforms and substituted stylish, comfortable work dresses in pastel tints chosen by the girls themselves, each selecting a color combination best suited to her own taste and complexion.

The result was a functionally designed garment that combined style and comfort with utility and safety. But before the "go ahead" order was given, we showed the design to selected groups of women workers from various departments. It was an immediate hit, although several changes were made as a result of employee suggestions.

The dresses are made of cotton fabric in a linen-like finish, vat-dyed in fast colors. The girls have a selection of four pastel tints with contrasting trim: water-green with mimosa cuffs and pockets; gray with brown cuffs and pockets; peach with rose trim; and mimosa with brown trim. An approximation of actual color choice turned out to be green, 28 per cent; mimosa, 26 per cent; peach, 25 per cent; and gray, 21 per cent. Incidentally, most blondes at Bayuk prefer green work dresses, while the red-heads go for green or mimosa as first choice.

Designed for Safety

All dresses are cut full for ease of movement. They have short puffed sleeves and seven gores for styling. The ten plastic buttons (which stay on, incidentally) are of a color matching the cuff and pocket trim. For safety reasons, the lower buttons are covered by a fly-front so that the buttons cannot catch on anything. There is no looped belt for the same reason, the belt fitting snugly to the figure. The dress collar is the "Revere" type. Each garment has three pockets, one over the left breast, and two in the skirt. The dresses have double underarm shields. Sizes range from 28 to 54.

The company sells the dresses to the girls at cost. It even passes on to them the benefit of the cash discount in addition to the initial large-quantity purchase benefits. Hundreds of dozens of dresses are ordered at a time. On delivery at the plant, the dresses are checked at the factory office and then distributed to storerooms in the various departments, ready for sale to Bayuk workers. The girls usually change their working dresses twice a week. They have the laundry work done themselves.

The company has never insisted that the girls wear these pastel dresses. But they are so attractive that everybody wants to wear one. Best proof of their appeal is that most of the girls wear the dresses as street wear.

There is no question in our minds that the new dresses have contributed to the high morale and efficiency of the girls in our plant.

How the Labor Law Should Be Amended

FACTORY asked eight outstanding men in the field of industrial relations. Here are their frank, revealing answers

THE OUTCOME of the national elections left little doubt that the Taft-Hartley labor law will be amended, perhaps repealed.

Will management take the same uncompromising stand the unions took two years ago, and fight to prevent any change in the labor law? Not if the attitudes expressed by the eight men who have written for FACTORY are any indication of the attitude of management generally.

To present to its readers a cross-section of management opinion on this vital subject, FACTORY asked eight outstanding spokesmen for leading companies, consultants, and management groups to answer the question: *"How should the labor law be amended?"*

FACTORY has given the authors the widest possible latitude. The opinions expressed are not necessarily to be interpreted as those of the editors or of the organizations with which the men are associated.

One fact stands out: There is complete agreement that amendment will come, that management is willing that it come, and that the law can be improved from the point of view of the unions, management, and the public alike.

There is less agreement as to what specific amendments should be made. FACTORY believes this is a healthful situation, hopes to stimulate discussion through the presentation of divergent views.

1. E. H. VAN DELDEN, Director of Industrial Relations
Libbey-Owens-Ford Glass Company, Toledo

The ultimate form of our evolving national labor policy is not yet clear, but few would question its direction. The impetus of a trend is inescapable, and in the case of the Taft-Hartley law, even though the language may be changed, those of its provisions that have proven inadequate to protect the public interest will undoubtedly be strengthened. One of these provisions is the method of dealing with national emergencies. By now the inconsistency of temporary treatment to deal with situations endangering national health and safety has become apparent.

In my opinion, there is no way to cope with the concentration of economic power inherent in industry-wide bargaining, giant corporations, and all-inclusive unions except by means of national labor courts. But it is unlikely that we shall progress towards such compulsion except by stages. A realistic first step, therefore, would be to amend the present provision to provide an expanded fact-finding power under which the experts will be required to recommend a settlement pattern. This will be compulsory arbitration of a sort because there will be public pressure to accept such findings.

In addition, the President should be granted the right to request extension of an emergency injunction beyond 80 days in certain specified situations, especially those involving federal installations or activities. Along with these changes, the requirement of a secret ballot on the employer's last offer could well be dropped as serving no useful purpose.

The provisions that require the filing by unions of financial information, and of affidavits that their officers are not members of the Communist Party, are

related. The financial information should be filed with the National Labor Relations Board, where it could be of maximum value, rather than with the Secretary of Labor. The affidavit requirement should be extended to include employers. In addition, the term "officer of such labor organization" should be broadened to plug any possible loopholes in the requirement.

The closed shop ban should be lifted with certain restrictions. This is especially necessary in industries where work is of a temporary or casual nature. The objective should be to prohibit closed unions which artificially restrict the labor supply. The union-shop election requirement should be removed, allowing a de-authorization vote upon petition at the expiration of a contract. The present prohibitions against discharge of an employee at the request of a union should be retained in order to keep such action from being forced for political or personal reasons. Such methods in the past have enabled Communists to remain in union office by removing the opposition.

The provision whereby an individual employee or group of employees have the right to present grievances should either be eliminated or amended to provide that certain types of grievances may be settled directly with the worker. The special protection for craft groups contained in the definition of an appropriate unit should be dropped. Both of these provisions constitute a constant source of friction.

The section providing that the board is empowered to arbitrate jurisdictional disputes after a strike has occurred, should be strengthened. Provision should be made for the issuance of a temporary restraining order in such situations at the time the jurisdictional demand is made, to prevent damage and to provide an opportunity for arbitration without pressure.

The procedures established for safeguarding welfare funds should also be strengthened in order to insure sound pension plans and to protect the equity of individual workers. The definition of "commerce" and "affecting commerce" should be so clarified that purely local enterprises are freed from federal intervention or the threat thereof in their labor relations.

On the whole, the law has worked relatively well so far, even though many of the major issues are still to be decided by the courts. As additional deficiences are discovered, however, they will be brought to public notice through the agency of the "watchdog committee" whose recommendations should be given careful consideration.

2. WADE E. SHURTLEFF, Director of Industrial Relations
Willys-Overland Motors, Inc., Toledo

In a free economy there can be little justification for governmental intervention in labor disputes generally. Instead, democracy can best be served by reliance upon voluntary cooperation between management and labor. Certainly the progress achieved in the brief period since the turbulent sitdown days of 1937 is cause for optimism. Nevertheless, there is an unfortunate tendency upon the part of many men in labor and management to look upon legislation as a possible panacea for the complex collective bargaining troubles confronting them today.

I am convinced that the cooperation necessary between labor and management can best be achieved when governmental intervention is at a minimum. Rather than seeking legislative relief from Congress and drifting toward statism, many of us could more profitably explore methods for improving labor relations at the plant level.

This is not to say that labor legislation is not necessary. But I submit that it should be aimed primarily toward preventing the interruption of services vital to the health and safety of the public and toward establishing curbs on the abuses of bargaining.

If the Taft-Hartley law is amended or repealed (with new legislation taking its place), I believe disputes within NLRB jurisdiction which threaten the health and safety of the nation *or* of a community should be subject to a cooling-off period and investigation by fact-finding boards empowered to make specific recommendations for their settlement. The procedure set forth in the Railway Labor Act might well serve as a pattern. Not only is such legislation essential, but increasing pressure must be put on the parties to such disputes to accept voluntary arbitration. Failing in this, we shall eventually be faced with compulsory arbitration as an alternative to the disruption of vital services.

Nor can any new labor legislation ignore abuses of collective bargaining on the part of either labor or management. But the means of protecting democracy's instruments without threatening democratic freedoms is one that cannot be lightly legislated. Only a slim margin separates a curb on the abuse of a democratic institution and a curb on democracy itself. In setting forth unfair labor practices, we cannot afford to curtail civil liberties to achieve partisan advantage.

I do not believe a ban on political expenditures is warranted in the Taft-Hartley law or or in any new legislation that may be enacted. In bringing unions under the scope of the Federal Corrupt Practices Act, a large segment of our population is deprived of a normal means of influencing public policy. The legis-

lators undoubtedly felt that the same considerations attach to a labor union as to a corporation. This attitude ignores the pertinent fact that a union is a social institution and is not organized solely for economic purposes.

Likewise, I believe the requirement of non-Communist affidavits upon the part of union officials is ill-advised. If our domestic Communists constitute a danger to democracy, and I believe they do, we should protect our way of life from their attacks. But I do not subscribe to singling out labor legislation as the vehicle to accomplish this otherwise desirable objective. Denying the protection of federal labor legislation to thousands of loyal American workers because of membership in the Communist Party by one or more of their officials is a very slight contribution to democracy. Given time, I believe the rank-and-file of unions dominated or influenced by Communists will rid themselves of these individuals. Certainly this has proved historically true in our older unions.

Finally, collective bargaining has historically dealt with matters of wages and working conditions. I see no necessity now for re-defining or limiting its scope to exclude emoluments that accrue to employees out of their employment relationship, such as merit increases, pension plans, and group health and insurance plans. Likewise, the type of union security to be embodied in labor agreements has long been a matter for collective bargaining rather than statute—and, I believe, properly so. I would favor the repeal of the present provisions in the Taft-Hartley law restricting union security.

The important factor is that we cannot legislate loyalty, good-will, cooperation, or the will to work. We in management and labor must strive to achieve these objectives at a grass-roots level, not in Congress.

3. HIRAM S. HALL, Director of Personnel Administration
Bigelow-Sanford Carpet Company, Inc., New York

In his final paragraphs, Mr. Hall suggests that, concurrently with amendments to the Taft-Hartley Act, Congress should consolidate all provisions of existing laws dealing with labor relations into a single statute. The purpose, as he expresses it, would be to provide "standard definitions and standard coverage," plus a codification of the court and board decisions handed down under the many frequently conflicting laws.

This suggestion has much to commend it. It deserves careful and serious consideration by all representatives of both management and unions, and by the members of the House and Senate committees that will write any new labor law.—The Editors.

Since the elections we have had many recommendations by management and labor for a national labor relations law that would be acceptable to each. To my way of thinking, more important right now than these specific suggestions is a sound labor philosophy that will give us a carefully blended law to assist management and labor in working out their problems without third-party interference.

What should that philosophy be? To develop a sound labor philosophy we must overlook political expediency. We must seek a law that is not union busting or management boosting. This law must not be a compromise or trade-off. It must be drafted in clear, understandable terms. It must be definite and practical. It must not be a lawyer's playground. Finally, the new law must emphasize the inviolate character of the union contract and strengthen the union's sense of responsibility to its members and management.

The Wagner Act had been on the books for twelve years; more than 98,000 court and board decisions explaining its provisions had been handed down. Then came the 1946 Congressional elections, followed by the Taft-Hartley Act. It unsettled almost all the law and regulation to which we had become accustomed. We had to start all over again.

Now we face a new labor law—not wholly Wagner or Taft-Hartley. Once more we must begin the tortuous process of adjustment.

This time let us not compromise, but work out an impartial law that will implement the objective set forth in the first section of the Taft-Hartley Act. That objective was to provide "orderly and peaceful procedures for preventing the interference by either [management or labor] with the legitimate rights of the other."

Let me emphasize and illustrate five points which I feel are of prime importance in any new legislation:

1. The new labor law must be practical. Let's take the union-shop election provision of the Taft-Hartley Act. How impractical that was! We may want to give our employees the right to reject a union shop, but our government can hardly afford to log-jam its administrative facilities for this purpose. Furthermore, as it turned out, we were handicapped rather than helped in negotiations. Even the most hard-boiled industrial relations director was unwilling to hold out against the union shop when employees had voted in favor of it.

More profitable than the government-sponsored union-shop election, it seems to me, would be a secret ballot to determine if the majority of employees wanted to go out on strike. A strike called under these circumstances would be settled quickly.

Just how realistic was the closed shop ban? Often management and labor worked together so well under a closed shop that they agreed to questionable subterfuges to perpetuate it. In the maritime and printing industries the ban was more of a hindrance than a help. Too frequently the closed shop ban led to disruptive turmoil, litigation, and ill-will.

2. The new labor law must be clear, not confused

and uncertain. Take the anti-boycott provision of the Taft-Hartley Act. As helpful as such a provision can be, I agree with the American Federation of Labor. Said AFL: "It uses language that is so broad and vague as to render it impossible for anyone to say precisely what the provisions dealing with boycott mean."

Equally unclear were the provisions outlawing feather-bedding. General Counsel Denham of the NLRB said they eliminated standby musicians; but it was perfectly lawful for another truckdriver to take over our trucks at the state line despite the competence of the regular operator. Is this consistent?

3. The labor law must be definite; it must not go farther than its makers intend. Did the drafters of the Wagner Act anticipate that it would give rise to an Inland Steel decision requiring us to bargain with three or four unions in a single plant over the actuarially complicated provisions of a pension plan? Or an Allison merit rating case that would make us disguise our efforts fairly to evaluate the work of our employees through pseudo-incentive or make-shift bonus plans?

4. The newly introduced concept of an enforceable common-law labor contract must be retained. Until Taft-Hartley, a union contract was hardly more than a collection of promises enforceable by labor but not by management. Taft-Hartley was a big step forward, giving the union agreement the common-law sanctity of the commercial contract. For the first time the legal principles of agency, consideration, and the right to sue and be sued were introduced.

5. Finally, doesn't this Congressional session provide an ideal opportunity for reconciling the conflicting provisions of all our national labor laws? Here's what I mean. Taft-Hartley withdrew NLRB protection from supervisors and defined supervisors. The wage-hour law also exempted supervisors, but defined them differently.

Taft-Hartley defined interstate commerce. It is also defined in the wage-hour law, but in different words, resulting in different court interpretations. Why not standard definitions and standard coverage?

And while we are at it, why not reconcile as one national labor law the Public Contracts Act, the Portal-to-Portal Act, the Federal Anti-Injunction Act, and the labor provisions of the anti-trust laws? Why not take the final step and codify the thousands of court and board decisions that have been handed down under these acts?

4. RALPH M. MONK, Director of Industrial and Labor Relations
Caterpillar Tractor Company, Peoria, Ill.

The Taft-Hartley Act is continuing to prove itself a sensible piece of legislation. It has by no means crippled labor. On the contrary, the wage and other gains made by labor since passage of the act offer convincing proof that the purpose of the act is not to stop progress, but to stop abuse.

Various alterations in the Act have been proposed. For example, it is argued that union shop elections not only burden the National Labor Relations Board, but are also a waste of time because the union shop is approved anyway. The burden and high percentage of approvals make persuasive argument. And yet the burden will diminish as the union shop question is more widely resolved. Furthermore, the high percentage of approval is easily understood because few unions would risk such a vote unless the outcome were "in the bag."

Negotiated agreements are ordinarily made subject to ratification by the union's membership. This is as it should be. However, if the agreement contains a union shop clause, it means that those who are not then members of the union are ineligible to approve or disapprove the clause that is intended to make them members immediately thereafter. It is therefore logical that both members and non-members should be entitled to vote on the union shop question. Perhaps it would be more realistic, however, to have this vote *after* negotiations rather than before. If the vote were to be taken after the bargaining, the results would more accurately reflect true employee opinion on the union shop issue. Employees would also have the opportunity to evaluate the entire contract under which they would become members.

There has also been a great deal of talk about the non-Communist affidavits. Unquestionably, this particular part of the act has been of benefit to employees and the nation as a whole. Because of it, Communist influences in labor have been given a severe jolt, and, if the provision is continued in effect, it should go far to make American labor unions truly American.

It is interesting to note that some unions which openly condemn the act have at the same time unilaterally extended the non-Communist affidavits down to lower ranks. They have found the non-Communist affidavit an effective tool well worth the using. I see no reason, however, for not amending the act to require management officials to sign and file the same affidavits.

This provision of the act has been bitterly attacked by the unions and has caused much dissatisfaction and ill feeling on their part. Since the entire purpose of the act was to attempt to balance the rights and duties of management and unions, requiring management officials to sign and file such affidavits would have a good psychological effect on bargaining relations and at the same time would not weaken the act in any respect.

All in all, the Taft-Hartley Act has gone far to correct abuses that were detrimental to the interests of employees, their employers, and the general public. In only one major area is it lacking—and that area is industry-wide bargaining.

In several ways industry-wide bargaining weakens

or destroys healthy competitive forces. In the first place, it tends to standardize wages and prices. But perhaps even more important, industry-wide bargaining makes the strike a weapon more against the public than against the employers. This is why—employers are in competition with one another, and when one employer is down on strike, only to see a competitor taking over his business, then there is a compelling competitive force to get the strike settled, and quickly. But when all the employers are in the same boat, the incentive for a quick settlement is absent. And the same goes for the employees. If they are alone in their strike—and see others in their industry still working—they are naturally more insistent upon reaching a settlement and getting back to work. When these forces are not at work on both the employers and employees, the prospects of a protracted strike are considerably heightened.

It need hardly be pointed out that industry-wide strikes bring great injury to the public. The public has no way to turn. It is helpless—an unwilling victim of someone else's inability to settle some differences. It therefore becomes painfully clear that, when management and labor sit around a table to bargain on an industry-wide basis, they are bandying with the welfare of the general public. For the benefit of all, this should not be.

There is one approach to this problem that might work. If management and labor are willing to deal on an industry-wide basis, they should also be willing to guarantee that their preference to deal on that basis will not be to the detriment of the general public. Or, stated more concisely, before entering into industry-wide bargaining both management and labor should agree that any final differences will be resolved in one way or the other—say by arbitration —and without resort to strike or lockout.

If it were provided by law that any parties about to engage in industry-wide bargaining had first to agree that any final differences should be resolved by arbitration, it can be suspected that the trend would be away from such bargaining. Labor and management generally prefer not to submit major contract and wage disputes to the whims of a third party. And yet those who preferred to deal on an industry-wide basis would continue to have that right, but with the fate of the general public removed from the arena of the bargaining table.

It is paradoxical that a piece of legislation that is designed to bring greater equity into the labor-management relationship should be so misunderstood. Should some of the advocated sweeping changes be made in the law, employees and the public will be the real loser. I favor any change that is in the best interests of all groups. But such changes should be limited to improvements that will continue to protect employees, public, unions, and management alike in eliminating abuses.

5. B. F. McCLANCY, General Manager
The Associated Industries of Cleveland

It is difficult, perhaps impossible, to judge the workability of a law that has not been thoroughly tested. The Taft-Hartley Act fits neatly into this classification. Enacted as it was, in an intensely emotional atmosphere, and over the vehement protests of labor leaders, it had small chance of being considered by the public from a detached and analytical point of view. I think it is a good law, and a badly needed law. I am sorry that it became the football of partisan politics. Certainly it could be improved. Even its authors admit that.

When it was passed, the country was prosperous. Wages were good, and jobs easy to get. In the months that followed, there has been no change. I don't think that any conscientious labor leader would claim that the union movement has been set back in the past year. As a matter of fact, membership in labor organizations has increased. The fear is of what might happen if there should be a dip in the business cycle.

The Taft-Hartley Act cannot be compared with the Wagner Act, which was written during the depression. In the decade of the latter's existence, its faults and its one-sidedness became apparent. This led to the passage of the Taft-Hartley law. After the strikes of 1946 the public demanded it. Perhaps the people don't want it now. On that, I am unconvinced.

However, if it were left to me to rewrite the law, there are certainly some changes that I would make. To begin with, I would form a non-partisan committee, much on the order of the Hoover Commission, to make a thorough study of how labor and management have lived under the law, especially with regard to those sections of it that unions most dislike. I would ask for their recommendations, and, to a large extent, I would be guided by them.

While I was waiting for these recommendations (and, if my commission did a statesmanlike job, this would take two years or more), I would make some immediate changes. There are parts of the law that are obviously ill-conceived. Here are some of the more important changes I would recommend:

1. I would change the name. I mean this with no reflection on either Mr. Taft or Mr. Hartley, both highly capable men. Unfortunately, in the arguments *pro* and *con* that arose during the past year, they have become controversial figures, and I don't believe any law on labor that has their stamp of authorship has much hope of success. Change the name, and the opponents of the law would be stripped of their most potent weapon.

2. I would repeal the ban on political expenditures by unions. I wrote in FACTORY at the time the law was passed that I thought this section unwise. I still do.

3. I would eliminate the union shop election. I consider this simply a headache, and of no practical benefit.

4. I would give fact-finding boards the power to make specific recommendations for the settlement of national emergency strikes, and extend this power to cover all strikes within NLRB jurisdiction which threaten the health and safety of a community.

5. I would change the requirement for filing affidavits. I think that unions are justified to some extent in their arguments that employers too should sign. I don't think many employers would object. Also, I believe that the law should read "any organization advocating overthrow of the government," and should not be solely confined to Communists.

While on the subject of Communism, I would advocate that legislation be enacted making it illegal for an employer to grant any form of union security to a non-complying union. Perhaps an administration change is needed here. A simple form might be sent to an employer at the request of a labor union putting him on official notice as to the compliance to the affidavit sections of the act of its international and local officers. This would protect both employer and union.

One last point. At present, it is the obligation of a federal mediation and conciliation commissioner to suggest closed ballot elections when he is convinced that the employer has made his "final offer." I believe this should be mandatory, and that the commissioner himself should act as observer.

For the rest of the law, I think it should have a more thorough test by time. Certainly I favor in a general way the retention of the closed shop ban. Perhaps some arrangement could be worked out to allow the maritime industry to retain the hiring hall. Both management and labor seem to want it. I am convinced, however, that the principle is unsound.

By the very meaning of the word, it is the responsibility of management to manage. I don't think this should be allowed to pass by default.

6. JOHN R. BANGS, General Manager of Industrial and Personnel Relations, The Budd Company, Philadelphia

Now that the election furor has died down, it is time to reflect whether or not the much-discussed Taft-Hartley Act should be kept and modified to make improvements, drastically overhauled, or repealed outright. We believe the act has proved far more successful than even its authors and bi-partisan supporters expected. More and more workers have come to realize that the Labor-Management Relations Act of 1947 was enacted primarily for *their* benefit, and that companies got little out of it other than the opportunity to meet unions on a nearly equal basis.

Therefore, we believe that the act will *not* be repealed outright or drastically overhauled, because since its enactment there have been far fewer strikes; unions have gained and were not put out of business; and managements have not tried to do any of the horrible things predicted by labor leaders.

However, for the good of the country, the Taft-Hartley Act should be improved by amendments to accomplish the following:

1. *Collective bargaining should be clearly defined.* It is basically wrong for a merit increase to be dependent upon bargaining ability, upon an employee's good standing in the union, or upon his being "in" with his union leader. Therefore, individual merit increases should be removed from the scope of collective bargaining.

Similarly, recent decisions putting pension plans, insurance plans, and similar benefits under collective bargaining should be changed by law. Benefit plans are far too long-ranged and vital affairs to be subject to the whims of annual bargaining. This is particularly true in companies whose employees are represented by several unions in several localities, and under several state laws. Any agreement at all would be nothing short of a miracle where so many diversities are involved.

The problem of bargaining "out" a pension plan when an organization is in financial difficulty is also serious. We believe it is important, therefore, for the future of benefit plans, to remove them from the field of collective bargaining lest companies shy away from new plans, thus ultimately keeping their benefits from a large segment of employees who might otherwise benefit.

The original object of collective bargaining was to give adequate representation to employees in order to insure them fair and proper treatment as human beings and adequate wages for their work. It was not to attempt to take over the functions of management one by one and gradually eliminate management's discretion in running its business, handling its finances, and deciding which policies it could afford or felt were for the best interests of all concerned. It's time for the law to speak more clearly on this subject.

2. *All strikes should be approved by secret ballot by a majority of the workers involved before being allowed.* A strike is a serious matter for everyone but the high-up union leaders who push the buttons and still draw their salaries. Company officials worry, but they, too, continue drawing their pay. How about the worker and his family? They are the ones who really suffer. Therefore, they should be entitled at least to vote on a proposition so vital to their welfare.

3. *The "Anti-Communist" affidavit should be broader.* Communists are too clever at discovering loopholes and ways of influencing an organization without being "officers." The affidavit should apply to all officers, representatives, and committee members, with a broad interpretation of each. However, we oppose pointing the finger at any one political party in a free country

* In collaboration with James W. Townsend, Personnel Manager

unless actually declared illegal. Therefore, we feel that the words "Communist Party" should be stricken from the Act, and the definition kept broad enough to cover all with the same sentiments whether members of the Communist Party or not.

4. *Industry-wide strikes and industry-wide bargaining should be abolished.* Everyone is shocked and somewhat awed by the power displayed by one man when there is a coal strike. Slowly but surely the nation is strangled. No man should have this power, either actually or potentially. Whether a man works or refuses to work is his own personal business, and should not be used as a political football to force some economic or political maneuver at the expense of the community, the state, or the country.

5. *Any strike affecting the health, welfare, and safety of a community should be restricted as much as possible by federal law.* A child who dies because he cannot reach a hospital due to a local transportation strike is just as dead as a child who dies in the hospital as a result of a power failure during a coal strike. In this sense, certain local strikes can just as adversely affect the health, welfare, and safety of the family and community as national ones. We believe that no arguments between employees and their employer are so complicated that they cannot be settled by arbitration or by some other sensible and peaceful means.

6. *The present law on mass picketing is by decree; it should be codified.* There is no doubt that in some cases the privilege of picketing has been grossly abused. Prior to recent decisions it had become an open means of coercion and intimidation. Anyone who crosses a picket line is still called a "scab" in an attempt to convey the impression that he is some kind of criminal or perhaps worse. To enforce their will, pickets—who frequently are hired professionals—crowd together and try to prevent workers from crossing the line. Thus employees who care to exercise their right to work must be protected. The law should be codified, and the illegality of mass picketing clearly set forth.

7. *The section on political expenditures by unions should be clarified.* Those who contribute money to an organization are entitled to have something to say about how this money is spent. The original meaning of the drafters has, we believe, been misconstrued. The basis of the provisions governing political expenditures by unions should be the same as for the provisions governing corporations.

7. RALPH A. LIND, Director, Labor Relations Department
Stevenson, Jordan & Harrison, New York

1. Management should have the right to decide when merit increases shall be granted, provided the employee has the right to appeal from management's decision under a union agreement through the grievance procedure. It has been my experience that union officials usually are either not interested or not fair in determining whether an individual employee deserves a merit increase. Their interest is in accomplishing something that will sustain and maintain their leadership.

In view of a decision by the Supreme Court holding that management must bargain with unions on the matter of merit increases, it seems to me doubtful that anything can or will be put in the revised labor relations act that will take away this right.

2. Fringe issues pertaining to benefit plans, profit sharing, and so forth, are costing many companies a lot of money—frequently from 15 to 25 cents an hour. I doubt that there can be any specific limitation placed upon what can and cannot be requested by a union, but a revised law should be so worded as to make clear that management could not be charged with refusal to bargain in the event of a failure to agree to some of the extremely expensive fringes.

Employee security cannot be accomplished by forced collective bargaining. Most progressive companies want to provide accident, health, and group life insurance if they could see a way to do so.

3. The union-shop election is unnecessary, as we have learned by experience.

4. The leaders of organized labor would probably have no objection to retaining the requirement for filing non-Communist affidavits if management is also required to file them. I recommend such a change.

5. The law should provide for fact-finding boards to make specific recommendations for settlement of national emergency strikes. There must be some machinery to deal effectively with nation-wide strikes in basic industries or communications which have a paralyzing effect on production and distribution. The act should provide that a strike be suspended pending the report of the fact-finding board; also, that at the expiration of 80 days, or 60 days, the government should have the right to seize and operate the property involved in the dispute, if no settlement has been arrived at, and if such action is in the public interest.

6. The national emergency provisions should cover all strikes within NLRB jurisdiction which threaten the health and safety of the community.

7. There should be some limitation of mass picketing which intimidates employees. There is no justification for allowing it. If coercive mass picketing is allowed, there is no necessity for collective bargaining. Collective bargaining imposes a responsibility upon both parties to act in the public interest.

8. The bar on political expenditures by unions should not be ended, because such expenditures are not in the public interest; in many cases they represent forced contributions from union members toward the support of candidates or policies of which they

do not approve. If the ban on political expenditures by unions is ended, the ban on political expenditures by corporations should also be ended.

In addition to the changes referred to above, there should be a modified ban on so-called secondary strikes and boycotts, which are for an unjustifiable purpose. There also should be some sort of curb on jurisdictional strikes.

There should be in the revised law a requirement that 60-day notice be given by either party desiring to open a new labor contract.

Although some industries do not object to the closed shop, it is an unjustifiable restriction upon the right of workmen to secure jobs. Also in many cases the closed shop makes possible feather-bedding and racketeering.

An amended law should retain a provision against unfair labor practices on the part of employees which are unfair to employers.

8. JOSEPH E. MOODY, President
Southern Coal Producers Association, Washington, D. C.

Since November 3 there has been a continuous discussion as to what will happen to the Labor-Management Relations Act of 1947. There can be no doubt that the act was in for a careful review no matter who was elected.

There is danger of a vindictive attitude on the part of the Administration, if employers refuse to consider any revision of the act, especially those parts that did not work as expected. As an official high in the present Administration told me, "I hope the employers will not act as the union leaders did before the enactment of the Labor-Management Relations Act and refuse to consider any suggestions, because if they do, the result will be the same—they will have little effect on the final result."

There is one consideration in this matter that so far I've heard little about—the rights of the individual workman. After all, the act was primarily for the protection of the rights of the individual; there were few specific clauses having to do with employers' rights. We, as employers, should therefore be careful that our recommendations do not put us in the position of relinquishing something that really is not ours to relinquish.

I have heard no talk around Washington that would indicate any thought on the part of the Administration of cutting the authority of the government to intervene in a national crisis.

There is a struggle of agencies to take over the authority of some others. The difference of opinion between the NLRB and the "Counsel" for the NLRB is one of great importance to all of us, because we certainly do not again want the old system of policemen, prosecutor, and judge, all in one.

The independence of the Mediation Service must be maintained if it is to have any effectiveness. In this it would seem that the unions have as great a stake as the employers, even though the individual worker has by far the greatest stake of all.

The union-shop election clauses have not been effective when the elections have been held. In the coal industry, it has presented a threat to the validity of the contract, even though all concerned were sure of the outcome, if an election were held.

The closed shop is a different matter and is complicated by many state laws now on the books. The nature of the closed shop is contrary to the fundamental rights of the individual workman. Although there seem to have been some instances when it worked out, there should be real controls on any recognition that may be granted.

The Communist affidavit has been a bone of contention that seems to be based on personal pride in some outstanding cases. The recognized Communist control of some of the large unions mitigates against its elimination. There certainly should be assurance to employer, employee, and union that those with whom he must deal and cooperate, are not working for the overthrow of the United States government.

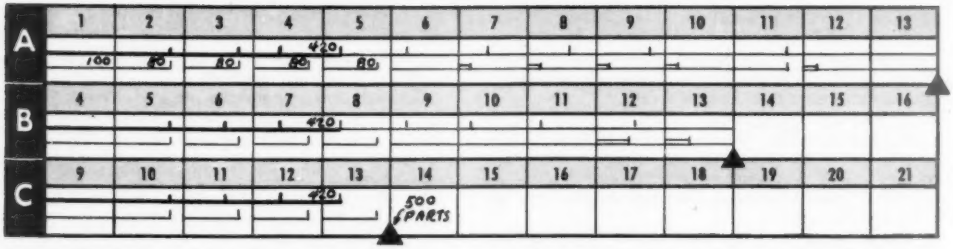
The definition on limitation of the scope of collective bargaining should be part of collective bargaining. There should be no compulsion on the part of the government to make an employer deal on matters that are part of the responsibility of management beyond wages, hours, and working conditions directly affecting the job. It is just as fair to require the union to bargain concerning the internal working of the union, as to require the employer to bargain concerning the ability of the company to provide the extras beyond a fair wage, proper hours, and working conditions.

It is fundamental to the success of American industry that a man be secure in his right to work as well as to strike. Union practices that are coercive, rather than persuasive, should be controlled, whether this be "mass picketing" or some other activity.

The question of expenditures for political purposes by unions has had a dramatic play in the public eye because of the interest in its effect on free speech and other constitutional questions. There should be no restriction on such union activity greater than that imposed on the same activity by corporations or employers. Both should be treated alike.

We have seen certain practices by the large unions that are monopolistic. The monopoly of the unions in some industries far outstrips anything that corporations have ever exercised. The same restrictions that are imposed on corporations should also be imposed on unions—no more, no less.

It is important, above all else, that employers work with Congress and Administration leaders to work out this vital problem of proper rules for collective bargaining. No one can expect to legislate industrial or labor relations any more than marital relations. But sound, fair rules will help in playing this vital game successfully.



GANTT CHART adjusted for time lags between processes. Figures on heavy upper lines in each row show cumulative production to current date of final process. Figures on lower light lines show daily production

Adaptation of Gantt Chart to Continuous Operations

WALTER A. STRAUSS • INDUSTRIAL ENGINEER, AIR REDUCTION SALES COMPANY, JERSEY CITY, N. J.

IN MASS PRODUCTION most operations run continuously for long periods, so that starting and finishing dates are of little interest. But at Air Reduction Sales Company our main concern is the coordination of daily operations. In order to keep inventories low, banks of material between processes are held to a minimum. Each process depends upon the daily output of the preceding stage. A conventional Gantt chart didn't give us a clear enough picture of the usual time lag between processes. To remedy this, we use an improved method of charting.

Time Lag Charted

Consider three processes—*A*, *B*, and *C*, as examples. The product may spend two working days in process *B*. We may have a curing or transportation delay of one day between *A* and *B*. In this case there will be a time lag of three days between the output of process *A* and that of process *B*. Parts finished on the first day in process *A* will be completed in *B* on the fourth day.

As a result of this time lag, the output of *B* on the fourth day depends upon the production in *A* on the first. Similarly, if there is a time lag of five days between *B* and *C*, the output of *C* on the ninth day will depend on the output of *B* on the fourth, and in turn on the output of *A* on the first.

If such a series of continuous processes has to be scheduled, it has been found useful to incorporate time lag between processes into the Gantt chart itself. In this case each vertical column does not represent the same calendar period as is customary. Instead, as you follow the column from top to bottom, you list the dates on which one lot will pass through consecutive processes. In our example (illustrated above), the first column will represent the first day on line *A*, the fourth on line *B*, and the ninth on line *C*. Thus, the quantities turned out by the three processes on the first, fourth, and ninth day, respectively, are shown in the same column, so that they can be compared easily.

Scheduled and Actual Output

On this chart we can record scheduled and actual output, both daily and in cumulative totals. In the example, the schedule for all machines calls for 100 parts per day, but it is unnecessary to show this fact graphically since the schedule is uniform throughout.

In charting totals it is not advisable to draw a heavy line for the total (upper line) up to the current date for every operation as is customary. A thin, continuous line (upper line) is drawn for each machine up to the current date to show the cumulative total.

The heavy lines represent totals for each operation up to the date which corresponds to the current date for final process. In other words, heavy lines are drawn to the dates which are in the same column as the current date for the last operation. As illustrated, this is the eighth on line *B* and fifth on line *A*. We see from this that operation *C* is 80 parts behind schedule as of today (13th).

Final Operation Affected

This occurs because operation *A* was the same quantity behind on the fifth; *B* and *C* have used up all of the material available to them. Because of the time lag between *A* and *C*, the loss of production in *A* up to the fifth affects the final operation *C* today (the 13th), although *A* has caught up in the meantime and is now up to schedule as shown by the thin line for *A*.

The lower line in processes *A*, *B*, and *C* shows actual daily production. For example, in *A-1*, 100 parts were completed and the line extends across the box. In *A-2*, only 80 parts were produced, hence the line is broken. In *A-3*, production starts at zero and 80 parts were again produced.

This method of incorporating the time relation of continuous operations in the chart itself gives us a much clearer picture of conditions.

The Cost of Maintenance in Seventy

Compiled from data on profits and operations contained in a survey of the Securities and Exchange Commis

INDUSTRY[1]	NUMBER OF COMPANIES		TOTAL NET SALES, DOLLARS[2] (in Thousands)	
	1945	1946	1945	1946
Agricultural machinery and tractors	9	9	1,469,742	976,03
Aircraft	19	19	5,752,814	746,78
Apparel and related finished products (shirts, ties, hats, underwear)	22	22	235,465	308,06
Automobiles	9	9	5,038,899	3,397,25
Biscuits and crackers	6	6	352,860	382,74
Bolts, nuts, and rivets	8	8	92,214	57,30
Bread and cake	9	9	398,859	451,13
Breweries	30	30	368,483[6]	380,24
Building equipment (heating, air conditioning, plumbers' supplies)	18	18	430,182	419,98
Building materials and equipment, miscellaneous	7	7	280,904	271,72
Carpets, rugs and other floor coverings	10	10	258,112	275,22
Cement	7	7	68,664	108,62
Chemicals	41	41	2,732,436	2,796,95
Chewing gum, candy, and confectionery	13	13	234,039	253,80
Cigarettes	7	7	1,709,039	2,150,04
Cigars	8	8	105,432	127,83
Clay products (brick, tile, refractories)	12	12	75,639	93,54
Clocks and watches	8	8	137,334	127,08
Commercial cars and trucks	13	13	544,444	295,93
Construction, mining, and related machinery (power shovels, loaders)	13	13	365,333	283,19
Dairy products	11	11	1,615,643	1,840,67
Drugs and medicines	15	15	719,099	825,75
Electrical supplies and equipment (switches, starters, wiring devices)	30	30	2,658,900	1,682,66
Engines and turbines	9	9	403,166	152,78
Fertilizers	5	5	156,888	158,89
Firearms	3	3	57,976	42,02
Food canning and preserving	14	14	562,283	572,35
General industrial machinery (pumps, air compressors, meters, valves)	38	38	1,010,378	713,58
Grain mill products (flour, cereals)	11	11	942,651	987,92
Grocery specialties and miscellaneous food products	15	15	1,082,300	1,158,19
Hosiery	10	10	89,703	111,00
Household appliances	6	6	57,845	54,54
Household utensils and table cutlery	9	9	101,788	123,02
Iron and steel foundry products	10	10	90,923	69,65
Leather tanning	5	5	49,825	47,87
Lumber and lumber products (plywood, sash, boxes)	17	17	279,691	303,10
Manufacturing industries—miscellaneous	22	22	559,018	345,24
Meat packing and allied products	14	14	3,965,206	4,001,31
Metal and glass containers	9	9	828,798	896,74
Metal-working machinery (machine tools, saws, drills, presses)	38	38	625,478	436,43

FACTORY MANAGEMENT AND MAINTENANCE, JANUARY, 1949 — Copyright, 1949, McGraw-Hill Publishing Co., Inc. — All Rights Reser

-Five Industries

ssion

	TOTAL MAINTENANCE AND REPAIR COSTS, DOLLARS[3] (in Thousands)		MAINTENANCE AND REPAIR COSTS PER CENT OF NET SALES					
			1945			1946		
	1945	1946	Individual Company		Industry Average	Individual Company		Industry Average
			HIGH	LOW		HIGH	LOW	
1	51,871	43,368	4.9	1.9	3.5	5.8	1.4	4.4
6	77,761[4]	22,817[4]	3.5	0.4	1.4	16.7	0.9	3.2
1	2,200	2,459	2.2	0.1	0.9	2.2	0.1	0.8
0	327,676	260,676	8.6	1.0	6.5	15.1	2.3	7.7
5	8,082	8,779	2.9	1.3	2.3	2.9	1.1	2.3
3	3,344	1,876[5]	6.4	1.0	3.6	6.9	2.2	4.6[5]
6	13,363	12,817	5.1	2.0	3.4	4.0	1.7	2.8
9[6]	7,642	7,636	8.2	0.6	2.1	7.0	0.4	2.0
6	11,900	13,218	4.1	0.2	2.8	6.9	0.2	3.1
3	10,696	11,832	5.4	0.9	3.8	5.4	1.2	4.4
5	10,240	9,151	5.0	1.0	4.0	3.9	0.9	3.3
6	4,970	7,900	11.3	3.3	7.2	14.4	3.5	7.3
6	139,347[7]	136,287[7]	12.4	0.2	5.1	12.9	0.1	4.9
2	2,490	2,448	2.0	0.1	1.1	1.9	0.1	1.0
6	4,197	5,798	0.7	0[8]	0.2	0.9	0[8]	0.3
1	1,066	1,332	1.9	0.3	1.0	1.9	0.2	1.0
0	6,073[9]	7,314[9]	13.2	3.8	8.2	19.8	2.2	8.2
8	2,488[10]	2,497[10]	2.9	1.1	2.0	3.7	1.1	2.2
6	6,461	6,269	3.1	0.1	1.2	5.1	0.3	2.1
3	11,133	8,762	5.7	0.8	3.0	7.2	1.0	3.1
4	34,949	41,196	6.2	1.1	2.2	5.6	0.8	2.2
5	10,069	11,648	2.8	0.2	1.4	3.2	0.2	1.4
2	56,197	49,799	7.5	0.4	2.1	8.7	0.3	3.0
9	8,133	6,076	4.5	0.8	2.0	7.1	1.8	4.0
8	9,029	10,706	10.5	3.0	5.8	12.8	3.9	6.7
5	1,609	1,851	2.9	1.2	2.8	5.2	0.6	4.4
4	12,534	15,087	4.6	0.8	2.2	7.5	0.9	2.6
1	23,591	19,547	6.0	0.3	2.3	6.8	0.2	2.7
4	6,803	8,418	1.3	0.4	0.7	2.3	0.3	0.9
7	18,605	19,466	5.0	0[11]	1.7	3.0	0[12]	1.7
5	1,679	2,149	3.6	1.1	1.9	3.1	1.5	1.9
5	1,648	2,505	5.4	1.1	2.8	8.2	1.6	4.6
3	3,993	4,167	5.4	0.8	3.9	6.2	0.8	3.4
3	7,068	4,954	10.8	3.5	7.8	11.7	3.2	7.1
2	1,138	1,113	4.8	1.4	2.3	3.1	1.3	2.3
2	5,853	7,238[13]	4.4	0.4	2.1	4.1	0.2	2.4[13]
8	13,518[14]	12,405[14]	10.2	0.3	2.4	10.1	1.0	3.6
5	55,406	54,677	1.8	0.3	1.4	1.7	0.3	1.4
5	37,298	46,028	7.9	1.6	4.5	7.3	2.1	5.1
8	16,890	14,399	5.4	0.4	2.7	9.2	0.5	3.3

ved

Footnotes on reverse side

Recordings Help Foremen Improve Industrial Relations Techniques

CLOYD STEINMETZ • DIRECTOR OF TRAINING, OWENS-CORNING FIBERGLAS CORPORATION, NEWARK, OHIO

TRAINEES ACT OUT AND RECORD A "TYPICAL FOREMAN SITUATION"

GOOD SUPERVISORS are not "born" but "trained." Such a practical working philosophy has materially aided the Owens-Corning Fiberglas Corporation in its development of a front-line supervisory force capable of efficiently handling all types of supervisory situations as they arise.

A few years ago management recognized that an alarming percentage of grievances and other troublesome undercurrents could be directly traced to inept handling of supervisory situations by new and, to a lesser degree, older supervisors. This situation was the natural consequence of a tremendous growth which had forced the appointment of "supervisory potential" employees to these positions without sufficient training in the proper handling of day to day personal contacts.

FIRST STEP • To correct the situation we had first to determine whether there were fundamental faults in the thinking of first-line supervisors which could be corrected through training.

All supervisors were requested to participate in a psychological test designed to determine the existing pattern of thinking on supervisory practices, company policies, and opinions held regarding the reaction of employees to typical situations. The tests dealt with the all-important area of management-worker relations and measured the understanding of the participants of the general psychological aspects of supervision.

Results of these tests were extremely informative: Top-level supervision (plant managers and staff members) recognized 98 per cent of the psychologically correct answers; department heads, 92 per cent; shift foremen, 76 per cent; first-line supervisors, 53 per cent.

The results indicated that because of a lack of knowledge of what constituted the correct attitudes, shift foremen only had a chance of being right 75 per cent and supervisors 50 per cent of the time in the handling of typical supervisory situations. Conversely, it also indicated that because of a lack of the same basic concepts of the correct approach on personnel problems, top management would differ in its handling of a situation in one out of every four cases with its foremen, and in one out of every two cases with its supervisors.

Immediately the question arose, "Is it any wonder that confusion exists and grievances arise amongst the hourly workers if management cannot agree on standardized good practice in the handling of similar situations?"

SECOND STEP • Our next move was to make an analysis of various troublesome supervisory situations in an attempt to isolate them by types. It was hoped that this would aid in the development of a well-rounded training program designed to assist supervisors in developing their techniques in the correct handling of these situations. When the analysis was completed it was found that the large majority could be boiled down into seven typical everyday supervisory situations:

1. How, what, and why to tell a subordinate when informing him that he is in line for, or about to receive, a rate increase.

2. What approach to use and what information to give an hourly employee when informing him that his efficient work has placed him in line for a first-line supervisory job.

3. When two or more men are in line for and are expecting promotion to first-line supervisory positions, how and what to tell the unsuccessful candidates.

4. How to inform a man who is abnormally good in the major aspects of his job that he has a responsibility as well for housekeeping, return of tools to the stock crib, and other relatively minor aspects of his work.

5. How to inform a secretarial employee who makes constant mistakes in transcription that work of a quality which she is turning out

can no longer be accepted. (This situation could easily be duplicated with production workers.)

6. How to approach subordinates on the matter of late arrival or early quitting, both to determine the reason for their actions or to deal out punishment or warning of consequences.

7. How and what to tell a man who has turned in a suggestion for improvement which has been returned with the notation "practical but rejected due to impending design changes," or for other sound reasons.

THIRD STEP • Finally, to implement actual training, it was decided to have supervisors meet weekly in groups of 12 to 15 (multiple of 3). At each meeting one of the cases is singled out for study and each group of three plays out the actual situation described in the case. In each group, one man acts as a supervisor, one as a worker, and the third as an observer-critic. With the aid of two soundscribers and inexpensive disks, soundscripts are recorded of two of the groups. Following the individual enactments, these soundscripts are played back to the entire group.

In order to minimize the personal element involved, the supervisor and worker, in each of the groups whose soundscripts are played back, are given a chance to analyze and criticize their own handling of the problem before it is turned over to the group. This gives them an opportunity to show that they have recognized their faults. The observer-critics of the other groups are then called upon to give a critical analysis of the handling of the problem in their groups.

The purpose of these training sessions is to:

1. Anchor in the minds of supervisors, through the medium of multiple sense impressions, the correct methods of handling supervisory situations.

2. Impress on supervisors the necessity for considered action in these and similar supervisory situations by dramatizing them.

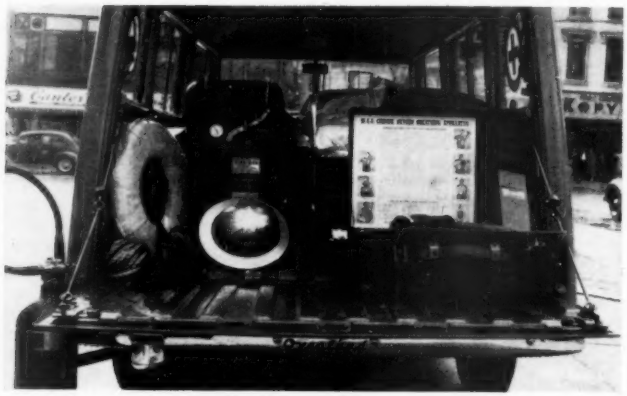
3. Give supervisors a feeling of security and adequacy in handling such situations by making it easier for them to correct their mistakes and adjust their supervisory techniques through the medium of protected practice sessions.

4. Enable supervisors to observe their supervisory practices as in a mirror, while at the same time reducing embarrassment to the minimum as all the "trainees" are in the same boat.

All these purposes have been achieved, and there is more consistency in handling typical cases.

An interesting development of this program is that supervisors who are now faced with a tough supervisory problem come to the training office and ask to act out and record their handling of the problem so they can learn from it on the "play-back." Some men repeat this process several times and in the difference between their initial and final efforts they see their own growth, and thus learn to improve their handling of supervisory operations.

Jeep Rushes Safety Equipment



ABILITY to reach any point in the plant is a prime feature of the emergency-equipped jeep now in use at Portsmouth Steel Corporation, Portsmouth, Ohio.

Modified by its maker for this special purpose duty, the jeep has become a complete ambulance, thus eliminating the delays sometimes encountered when it was necessary to wait for the city ambulance when accidents occurred. The rear of the jeep opens up, permitting easy loading and unloading of a standard ambulance cot. There is a seat for one attendant besides the driver.

The safety equipment, which the emergency car can deliver anywhere in the plant within a matter of minutes, includes:

Foam fire extinguishers, for oil fires; ice fire extinguishers, for electrical fires; several conventional fire extinguishers, for general use; a coil of heavy manila rope; a metal safety helmet; six pairs of boots; gas indicator; dust masks and goggles; fire axe; and life preserver. In addition, a complete, large size first aid kit is carried at all times.

The car also mounts two adjustable spotlights on the windshield. Their usefulness was shown recently when a slag car loaded with five ladles of hot slag broke in two. The crane operator had to work within 6 inches of high tension lines, but the spotlights permitted the salvage to proceed safely.

How Canadian Plants Are Meeting a Power Shortage

JAMES MONTAGNES • TORONTO, CANADA

Many industrial plants that use utility power are facing, or will face, a definite shortage of that essential service. The shortage exists in numeous areas of this country. This winter many plants will have to take steps to meet it. They can learn a lot from the Canadian plants that have already been confronted with the situation.

INDUSTRIAL PLANTS in southern Ontario, Canada, have had to cut their electrical power consumption about 16 per cent.

The reason lies in what is probably the worst electric power shortage on the North American continent. Since mid-October most cities have had power cut off for at least two hours daily. Since early November, Toronto, the second largest city in Canada, has had additional power shut-offs from 45 minutes to an hour in the evening, five days a week. Plans are to continue these cuts, probably to increase them, until April, and to go through the same process for the next four years.

Close to a third of the entire industrial production of Canada comes from the power-short area. No force has been used to oblige industries to conserve power, but there has been voluntary cooperation resulting in a definite switch in working hours in a large number of factories, including most of the larger plants. By mid-November, for example, close to 500 of the 4,000 factories in the Toronto area had made drastic changes in their weekly working hours on a voluntary basis.

The power shortage has been caused by a number of factors. Ontario's electrical energy is derived mainly by harnessing water power. Power developed in Ontario comes under the publicly owned Ontario Hydro-Electric Power Commission, which sells it to municipally operated power commissions. Large blocks of power are purchased also from privately owned companies in Quebec provinces.

Too Little Rain. This year there has been a lack of rainfall. During the winter there was little snow. These two conditions resulted in extremely low water levels in the reservoirs of the generating plants, requiring conservation measures. In addition, the demand for power, both by industrial and domestic users, has exceeded forecasts.

Set Up Quotas. In Toronto all factories were placed on quotas, which by mid-November amounted to 84 per cent of the power used in October, 1947. If factories had expanded, due allowance was made. Similarly, new factories were given a quota allowance. From there on, a number of plans were formulated, all of which had the objective of keeping the factories in operation within their quotas.

Factories are reporting weekly the amount of power used. Special classes have been held to teach maintenance men how to read electric meters.

Changed Working Hours. In addition to meeting the quotas for weekly power consumption, Toronto factories have switched working time considerably. Early in November a survey showed that some 45 companies were closing all day Monday and working Saturdays. A number of companies close all day Tuesday and work Saturday or Sunday.

Close to 50 companies changed their Monday to Friday working hours so as to do some work on Saturday and Sunday. About 60 companies changed working shifts so as to use electric power available from midnight to 7 a.m. Canada Printing Ink Company, Ltd., changed its working week of 7:30 a.m. to 5 p.m. Monday to Friday, to a new set of hours—8 a.m. to 12 noon, 1 p.m. to 4:30 p.m. Monday to Friday, and 7:30 a.m. to 2:30 p.m. on Saturday.

Cut Out Waste. Major plants assign light police to see that all unnecessary lights are turned off. For instance, lighting in large storage areas was discontinued except when it was necessary to enter them. Sizes of lamps also have been changed to conserve power in storage areas.

In a number of factories plant engineers made the rounds to check on all production work and rearrange motor drives.

Gasoline-engine welding units are being used in several plants to replace motor-driven types.

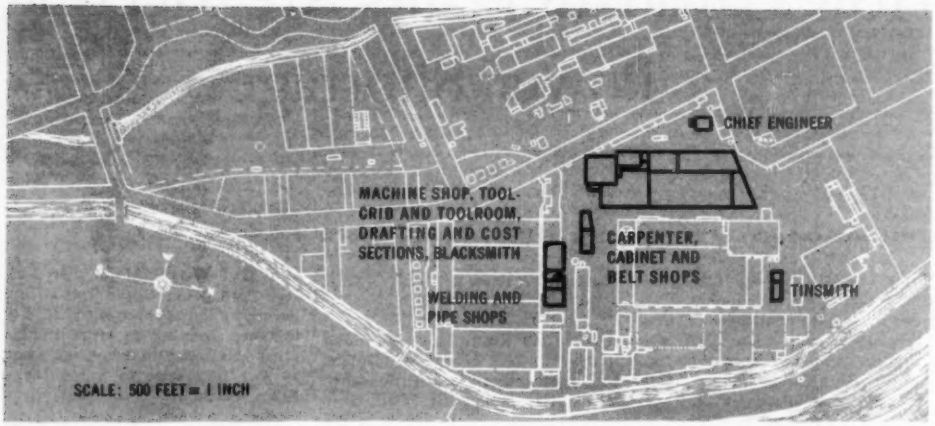
Use Diesel Power. Companies such as Massey-Harris Company, Ltd., are using diesel engines to generate some of their power.

Goodyear Tire & Rubber Company of Canada, Ltd., at New Toronto, uses a steam power plant for some of its processes and sells some of the power from this plant, when not needed by the company, to the municipal hydroelectric power commission.

On the labor front there is mainly cooperation from AFL and some CIO unions, although not all CIO unions are willing to sacrifice the convenience of the 44-hour, 5-day working week without premium pay for night, Saturday, or Sunday work. Few women want to shift to night or weekend work.

Seven Ways to Save Power

1. Shift one working day to week-end.
2. Change hours to do some work on week-ends.
3. Change shifts to use power from midnight to 7 a.m.
4. Assign men to turn off unnecessary lights.
5. Rearrange motor drives.
6. Use gasoline-engine-driven welders.
7. Use diesel power for some operations.


CHIEF ENGINEER
MACHINE SHOP, TOOL-CRIB AND TOOLROOM, DRAFTING AND COST SECTIONS, BLACKSMITH
CARPENTER, CABINET AND BELT SHOPS
TINSMITH
WELDING AND PIPE SHOPS
SCALE: 500 FEET = 1 INCH

BEFORE **Widely scattered repair shops caused needless lost time in routing work from one craft to another. Supervisors walked several miles daily to direct flow of work, other duties suffered**

Repair Shop Productivity Jumps

Improved shop and office facilities spur maintenance men to do faster, better work. Indirect but important result—improved manufacturing efficiency

T. W. E. BOWDLER • ASSISTANT CHIEF ENGINEER, BOTANY MILLS, INC., PASSAIC, N. J.

RECENT RELOCATION and modernization of plant maintenance facilities at Botany simultaneously solved a lot of maintenance problems. And continuing benefits from these changes will pay for the project many times over with interest.

This appraisal becomes more readily understood by a look at the threefold nature of the benefits:

1. Increase of 20 per cent in job productivity.
2. Better workmanship.
3. Improved morale of craftsmen.

The activities of about 175 craftsmen were involved in the program. Actually, the new shop layout occupies a total of only 11,200 square feet of floor area instead of the original 16,000 square feet. This was brought about by redistribution of available new area among the crafts to correct a former unbalanced condition. Also, better utilization of machine shop equipment is being practiced by use of a second shift.

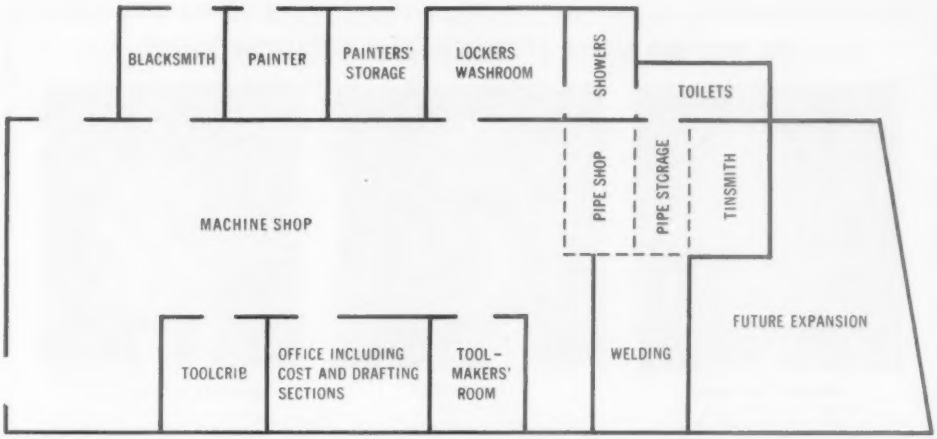
OLD LAYOUT. Geographically the base shops of certain trades were too widely scattered. Each shop was in a separate room or building. The tinsmith shop was 450 feet distant from the machine and weld shops. Adjoining the latter were the carpenter, cabinet, and belt shops. All of them were some 600 feet walking distance from the chief engineer's office and adjacent electrical and paint shops. The master mechanic was hard put to cover the ground in carrying out his duties; consequently supervision suffered.

So did work collaboration on multi-craft jobs. On "tie-in" repair orders time was lost in routing material from shop to shop. Although the machine shop was centrally located on the whole plot, most of the heavy work had to be hauled to several buildings nearer one corner. This central location also exposed the machine and pipe shops to considerable truck traffic of incoming and outgoing shipments.

Floor space in the machine shop was so cramped that no new machines could be added. Yet the pipe shop had so much room it was encouraged to accumulate unfinished work on the floor.

To cap all this, the number of maintenance craftsmen was increased in the spring of 1948 about 15 per cent to help in modernization of plant production units and equipment. Sanitation and washroom facilities became overcrowded.

Condition of maintenance equipment, particularly the machine shop, reflected depreciation and obsolescence. There were not enough machines to carry the load. Practically all machines were belt-driven from overhead lineshafts, involving a maze of belts and pulleys that made good lighting difficult with the old incandescent-type RLM ceiling fixtures.



AFTER **Centralization of major repair operations resulted in better coordination among crafts and faster work flow. New location is adjacent to electrical shop and near chief engineer**

20 Per Cent With New Layout

NEW LAYOUT. All shops except the carpenter, cabinet, and belt shops were moved 600 feet to the existing location of the paint and electrical shops to effect a good degree of centralization and to be close to the engineering office. The stated exceptions involve operations having the least interrelation in maintenance work. They were omitted from the move partly for lack of space in the new area, and also because they can service the plant equally well in their old location.

The new functional layout is shown above. Some departments are separately enclosed and others not, for good reasons. Work can flow easily among the machine, pipe, weld, and tinsmith shops. The blacksmith shop was isolated so that stray smoke that escapes the exhaust hood does not bother other workmen. Painters have a separate workroom and storage room for less distraction and better housekeeping. The electrical shop and motor storage (not shown) are adjacent to the machine shop section.

In the new plan the toolroom was separated from the toolcrib, which is now serviced by one man. The separation allows skilled toolmakers to work uninterrupted by the inquiries from workmen that always occur when the crib occupies the same quarters. All existing machines in the toolroom were discarded for new equipment.

In the office enclosure are located desks for maintenance foremen, drafting boards for maintenance draftsmen, and a section for operation of a maintenance cost system. Sending orders is thus simplified.

Only four new machine tools were purchased for the machine shop—two lathes, a shaper, and a keyseater. Most of the other machine tools were overhauled and where possible were converted to unit drive, so that instead of four lines of overhead shafts, as formerly, only one line now exists.

The new combined shop is provided with fluorescent lighting, and overhead unit heaters. A monitor-type truss roof with lowest chord at 21 feet assures good ventilation. Plenty of washroom and toilet facilities were installed close at hand. An old brick floor was covered with a layer of asphalt mastic for better footing and service.

HOW IT WAS DONE. The modernization project took six weeks. Machine moves had to be made one at a time to sustain maintenance schedules. In each case the exact floor layout was marked off, foundations were prepared, and all electrical and other necessary connections made ready. No machine tool was out of operation more than one day.

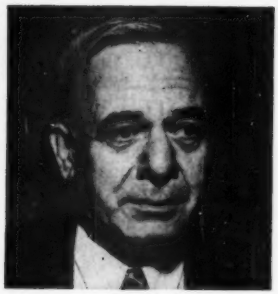
RESULTS. None of the techniques just described is of startling report, but it has been shown already what the combination of all has made possible. This is because of better supervision, easier flow of material to subsequent operations, and less time expended in lost motion between shops. Traffic snarls in transporting materials are minimized. Finished work does not have to travel as far.

Better supervision also is giving better quality of work. To this end also credit the modernized machinery, as well as the better tools from a revamped toolroom. And when questions of any kind arise, conferences for quick settlement of problems are much easier among foremen in one central office.

The workmen are pleased with the improved sanitation facilities. And because most operations are under one roof, men are less susceptible to catching colds in severe weather than when traveling frequently between shops.

THE MEN WHO DIRECT ORGANIZED LABOR'S POLITICAL ACTION

JOSEPH D. KEENAN
Director, Labor's League for Political Education (AFL)



JACK KROLL
National Director, Political Action Committee (CIO)

(Wide World photographs)

GEORGE M. HARRISON
Chairman, Labor's Committee for Truman and Barkley (mostly AFL)

What Labor Did in the Election —and What It Will Do

Labor is in politics to stay. Here's an analysis of past performance — plus a prediction of things to come

J. M. GAMBATESE • LABOR EDITOR WASHINGTON

NOVEMBER 2, 1948, MARKS THE BEGINNING of a new era in the American labor movement. President Truman's upset re-election and the return of Congress to Democratic control after a two-year hiatus made up the labor leaders' minds. They are in politics to stay—not only at election time but the year around.

Whether they were responsible for sweeping the Republican majority out of Congress and keeping Dewey out of the White House makes no difference. The union leaders tasted victory and liked its sweetness. The memory will linger for years even if they should stub their toes the next time.

Crystallization of the labor movement into a potent political force is bound to have its impact on management. When labor leaders can influence legislation—whether at the city, state, or federal level—they can affect your business and business operations.

Legislation is not all. You can expect union leaders to play a bigger role in administering the laws, or influencing their application, through the executive branch of the government.

Management won't have to wait long, either, to detect the new power of the union bosses. It will feel this power in drastic changes in the Taft-Hartley labor law and in fourth-round wage negotiations coming up next year.

Management is faced with this bald fact: *It is dealing with a political as well as an economic organization when it sits down to bargain with a union.* That circumstance can make a difference. The old-line union leader who wanted only better wages and working conditions for his dues-payers is rapidly becoming the vanishing American.

The new union leader also wants to bargain with you about prices, profits, production, productivity, health benefits, and pensions. And he will use the government if necessary to achieve his objectives.

Broader Interests for Labor

In recent years labor's lobby on Capitol Hill has taken strong positions on issues other than labor. Organized labor's interest has been broadened to include such matters as steel production capacity, inflation controls, rent control, material allocation, foreign policy, taxes, education aid, housing, and social security.

Labor's influence will be felt over a wider part of the economy. Union leaders will get a more friendly hearing at the White House, in government offices,

UNION MEMBERS IN CONGRESS GUARANTEE LABOR'S POLITICAL INFLUENCE

IN THE SENATE

Hubert H. Humphrey, Democrat, Minn.—member, American Federation of Radio Artists, AFL

IN THE HOUSE *(All Democrats)*

Edward A. Garmatz, Baltimore—member, International Brotherhood of Electrical Workers, AFL

John E. Fogarty, Harmony, R. I.—officer and former president, Bricklayers Union, Local No. 1, AFL

Thomas H. Burke, Toledo—member, UAW; secretary-treasurer, Toledo Industrial Union Council, CIO

Andrew J. Biemiller, Milwaukee—former AFL organizer

Richard Bolling, Kansas City—former union organizer

Roy W. Wier, Minneapolis—executive secretary, Minneapolis Central Labor Union, AFL

George M. Rhodes, Berks County, Pa.—labor editor and president, Federated Trades Council of Berks County, AFL

Leonard Irving, Kansas City—member, Hod Carriers & Common Laborers Union, AFL

James V. Buckley, Chicago—former president United Automobile Workers, Local No. 714, CIO

and in Congress. But we shall not have a labor government.

The country—that includes management, of course—is in for a re-deal of the New Deal. A re-deal for farmers as well as labor. Because if there is one fact that stands out from an analysis of the election returns, it is this: *Organized labor alone did not win this election.* It was won by a combination of laborer, farmer, white-collar worker, consumer, and a lot of other prosperous citizens who felt the Democrats offered the best insurance for continued prosperity. Union leaders know this. More important, Truman knows it.

No Mandate for T-H Repeal

Was the election a mandate for repeal of the Taft-Hartley law passed on June 23, 1947? The results support the view that it was not. It was a Democratic vote, a prosperity vote, not an anti-Taft-Hartley vote.

Different groups voted Democratic for different reasons. Farmers because of price supports and farm prosperity. Housewives because of high prices blamed on the Republican Congress. Veterans and others because of lack of housing. Many union members voted against members of Congress who backed the Taft-Hartley law. Many Republicans did not like Dewey or his promises and either stayed home or switched to the Democrats. Others did not vote because they believed the polls which said Dewey was a cinch.

This was not an anti-Taft-Hartley vote because: There were 92 Congress Democrats on the November 2 ballot who had voted for the Taft-Hartley law. Not a single one was defeated.

Yet two Republicans who had voted against the law, both from industrial districts, lost their seats in the House. The two were John C. Butler of Buffalo and Homer R. Jones of Seattle. A third Republican from labor-strong Milwaukee—John C. Brophy—lost in the primary, although he, too, had voted against the law.

In defense of the loss of these labor-friendly Republicans, labor's political leaders point out that they were replaced by friendly Democrats. Thus George Meany, secretary-treasurer of AFL, can make the claim: "Not one single friendly seat in the House of Representatives was lost."

The AFL does claim credit for saving one friendly Republican, Rep. Jacob K. Javits of New York City, who fought off the candidacy of Paul O'Dwyer, brother of the Mayor.

All told, 114 of the 335 House members who favored the Taft-Hartley law (331 votes plus 4 pairs) will not return. Of these, 27 did not run for re-election, 14 lost in the primary, and 73 were defeated November 2.

There are 221, however, who were re-elected, just slightly more than the 218 necessary to make a majority.

In the Senate there will be 54 members who voted for the law, including four who moved over from the House. A Senate majority is 49. Of the 28 pro-Taft-Hartley Senators whose terms expired last year, seven retired; two—Umstead of North Carolina and Stewart of Tennessee—lost in the primary; eight were defeated in the election; and eleven were re-elected. One—Overton of Louisiana—died and was replaced by Russell B. Long, son of the martyred Senator, "Kingfish" Huey Long. He will vote organized labor's way, except on civil rights.

That the election was a clean Democratic sweep rather than a gang-up on the Taft-Hartley law can be seen from the fact that the Democrats lost only two seats in Congress, both in the House and both surrendered by Californians who retired—Clarence F. Lea, author of the Anti-Petrillo law, and Alfred J. Elliott.

The Democrats have convincing majorities on both sides of the Capitol in the 81st Congress. Yet neither House nor Senate will have even a bare majority of members who are against the Taft-Hartley law.

Even so, there is every expectation that most of the teeth will be yanked out of the Taft-Hartley law. The reasons are several. The 80th Congress had an-

ticipated some changes would be necessary when it set up the "watch-dog" committee. Many in Congress feel that the election was a mandate for revising the law just as the 1946 election was a mandate to enact it; others will now want to go along with Truman and the party platform calling for Taft-Hartley repeal.

Organized labor in this election teamed up with the farmers. In state after state the returns indicate that it was the farmers who gave Truman his electoral vote and also elected some Democratic congressmen, while the labor politicos struggled to hold their ground in the big industrial cities.

The big labor organizations put on a real political campaign without much of the hoopla that characterized other elections. They did a professional political job of organization down to the grass roots—the city block and the corner of Main and Market Streets.

With few exceptions, they tied their fortunes to the Democratic Party. They worked with it. They worked through it. They became a bigger part of it. Where the Democratic organization needed reinforcing, they moved in and did the job. This was especially true in Detroit, in Philadelphia, and in Illinois.

When the bankrupt Democratic committee needed some ready cash to pay for a radio broadcast, the union political organizations came through in the pinch.

What PAC Did

The CIO Political Action Committee distributed 10 million pieces of literature, including a "Speaker's Book of Facts" containing material on the campaign issues. It put out four 15-min. radio platters which dealt with prices, housing, civil rights, and Taft-Hartley. It sponsored two network radio broadcasts.

But above all it hammered away at registration and getting out the vote. A radio platter with eight spot announcements drummed this message into radio listeners.

The AFL Labor's League for Political Education furnished local AFL groups with recordings by prominent Hollywood movie and radio stars urging citizens to register and vote.

The union newspapers used full front pages for weeks to drive home the importance of voting. Few chances were overlooked—free transportation, babysitting, and prizes.

In Cleveland the 80,000 fans jamming the Municipal Stadium for a baseball game got handbills outside the gates urging registration with this warning: "Don't strike out on Election Day." Shop workers found handbills at plant entrances. Five sound trucks cruised the areas where working men lived; block workers rang doorbells; airplanes trailed banners over the city.

In Toledo 50 automobiles carried members of the CIO auto workers union to registration posts.

In Illinois the AFL and CIO had 17,000 members pushing doorbells on Election Day, most of them in Chicago. It got results: 82 per cent of the registered voters went to the polls in Chicago; downstate, only 72 per cent.

CIO took 4800 of its field employees off their regular jobs, assigned them to campaign tasks.

To influence the voting in favor of candidates they supported, both labor organizations distributed the voting records of all members of Congress and indicated whether they had voted "right" or "wrong." Significantly, they did not limit the test to the congressman's position on Taft-Hartley or labor legislation alone. They covered such other matters as the European Recovery program, taxes, aid to education, inflation control, rent control, housing, and social security.

This was important because the labor groups wanted to spread their influence beyond the labor circle—to the farmer, the white-collar worker, the professional man, and the small business man.

How Labor Spent Its Money

All this cost money, of course. CIO-PAC spent about $500,000 nationally and $1,200,000 in the field. This does not take into consideration funds raised by individual unions for their own special activities. Members of the CIO United Automobile Workers, for instance, paid for a nation-wide radio broadcast by Reuther. A picnic of steel workers in Pittsburgh raised $30,000 in a raffle. It was spent for precinct workers on Election Day.

A New York advertising agency had drawn up a lavish publicity program for CIO-PAC. It would have cost $650,000. The money was spent instead in the precincts getting out the vote.

The AFL political league reports it received $319,000 in contributions at its Washington headquarters across Lafayette Park from the White House. Some of this was handed outright to candidates for their own campaign use. Some was spent for literature, radio time, and Election Day workers. This does not include money spent by a few AFL unions like the carpenters and teamsters which did not play ball with the AFL political league.

Not included, either, are the hundreds of thousands of dollars spent by other labor political groups—Railway Labor's Political League, Machinists' Non-Partisan League, John L. Lewis's United Mine Workers, A. F. Whitney's Railroad Trainmen, and the left-wing CIO unions.

In all, organized labor probably spent about $4,000,000 in the campaign.

The miners, the teamsters, and the carpenters did not back Truman, but they cooperated with the others on most of the congressional candidates. The CIO leftists concentrated behind Wallace and a few candidates for the House.

Under the Taft-Hartley law, union funds could not be spent for political activity. The money had to be raised through voluntary contributions. This restriction did not affect campaigning through the regular labor publications.

Truman's election was of particular embarrassment to Lewis. He gave a left-handed endorsement to Dewey by heaping vitriolic verbal abuse on the President. A few days before the election three UMW district presidents in West Virginia openly urged the miners to vote for Dewey. Result: Truman carried the state with 60 per cent of the vote. Thus, for the third straight presidential election, the miners, who will strike at the mere lifting of a Lewis eyebrow, voted against Lewis's wishes.

The election also put Daniel J. Tobin, boss of the teamsters, in a hole. In the past he has headed the Democrats' labor committee; in 1944 Roosevelt opened his fourth-term campaign at a teamsters' dinner. This year Tobin sulked and let the teamsters vote as they pleased. The reason: His heir apparent,

David Beck, boss of the union on the West coast, was for Dewey and Warren.

The AFL political group played hands-off on the presidency, asserting that endorsement of the head of the Democratic ticket would imply endorsement of all the party's candidates. It wanted to play its cards in the congressional game.

AFL President William Green personally backed Truman. When the AFL executive council remained non-committal, George Harrison, president of the AFL railway clerks, gathered top labor leaders, mostly AFL, into "Labor's Committee for Truman and Barkley." And, of course, the CIO-PAC and its director, Jack Kroll, as well as other labor political groups (except the CIO leftists), supported Truman.

All labor groups backing the same candidate coordinated their efforts in the states and congressional districts, even though there was little cooperation at the top in Washington.

Dewey's labor support was nominal—the building service employees' union and the personal endorsement of Alvanley Johnston, head of the Brotherhood of Locomotive Engineers.

Concentrated on Congress

Yet the labor leaders behind Truman, like the Democrats themselves, did not have too much hope of a Truman victory. So they piled their efforts behind candidates for Congress. They knew that if they were going to get repeal of the Taft-Hartley labor law and favorable legislation on other matters, it would have to come from a favorable Congress.

The CIO has always played for big stakes—organizing mass industries and setting wage patterns for the entire country. It brought Associate Justice William O. Douglas, of the Supreme Court, to its recent convention in Portland to say nice words about organized labor's role in world affairs. Political observers considered this the start of a build-up of Justice Douglas for president in 1952.

The AFL Convention in Cincinnati put its year-old Labor's League for Political Education on a permanent basis, under the direction of Joseph D. Keenan.

Union donations of 10 cents per member will not be used for "political" purposes, but for "education." If the Taft-Hartley ban on union political expenditures is not modified, voluntary contributions again will be solicited for use in the 1950 election drive.

A Program for 1950

This is the program laid out for the LLPE:

1. Continue on a permanent basis at national, state, and local levels. (It is hoped by 1950 to have union political stewards in all of the 110,000 precincts in the country).

2. Supply reports on issues before Congress and the voting record of individual members on key bills to the labor press, to AFL members, and to the public. Furnish leaders of farm, teacher, small business, and professional groups with periodic reports and voting records on matters of interest to each group.

3. Develop many kinds of educational material. Send recordings by national union leaders and Congressmen to local AFL bodies for broadcast and use at union meetings. Explain labor's legislative and political position through motion pictures, turn-over talks, and the like.

4. Avoid direct lobbying.

5. Improve and increase cooperative relationships with farm, professional, liberal, non-partisan, and other labor groups. Integrate women's auxiliaries into the group.

* * *

Labor leaders are in politics to stay. There is no doubt of that. They are convinced that the interests of union members are affected by what happens in Congress and in government offices as much as, if not more than, by what happens at the bargaining table or on the picket line.

They tell their members: "What we win on the picket line can be taken away by Congress." They cite the closed shop and union-controlled welfare funds paid by management.

Labor leaders in politics are nothing new, of course. Many have been delegates to political conventions; many hold public office, both elective and appointive.

Through the last election, the labor organizations became the most potent group in the Democratic Party. The South lost influence when the election proved the Democrats could win without 38 electoral votes from the solid South. Labor leaders, both CIO and AFL, will have a greater voice in the affairs of the Democratic Party.

The election also settled, for the time being, the question of a possible third party for labor. It proved that the labor vote can be more effective by asserting itself through one of the two major parties. Wallace's Progressive Party, backed by Communists and left-wing CIO unions with more than 1,200,000 members, flopped miserably. It picked up little more than a million votes.

Will Throw Their Weight Around

The labor politicians don't expect to run the government, but they do expect to throw their weight around and have it take effect. They will do it through their own members and friends in Congress and in government offices, and through the impetus of their newly-won political influence. The leftward trend of the November 2 elections assures that during the next two years.

How long this situation will continue will depend on the trend of the times and how the labor organizations develop and use their influence in governmental affairs.

Responsible labor leaders know that the labor vote alone could not—and did not—win the election. Furthermore, they can count noses and figure out that they do not have a majority of what they call "friendly members" in either branch of Congress.

Rightfully, many of the after-election statements of union political leaders gave credit to the joint efforts of the worker, the farmer, the independent voter, the professional man, the housewife, and even the Democrats. Labor's campaign in 1948 was aimed at all these groups. And it is a sure thing that union political leaders will keep right on trying to reach the same segments of the population.

For they know the going will be tougher in 1950. In that election there will be no presidential campaign. More important, there may be no real incentive issues like Taft-Hartley, prices, and housing. In 1946 the voters turned to the Republicans. It *could* happen in 1950. That's why some labor leaders feel their big political job is not by any means behind them, but ahead of them—in 1950.

An Instruction Manual Improves Plant Engineering Efficiency

For efficient administration of plant service personnel, define responsibility and tell how you want each job done. Put it all down in black and white

C. B. MUIR • SUPERVISOR OF PLANT ENGINEERING, CANADIAN GENERAL ELECTRIC COMPANY, LTD., PETERBOROUGH, ONTARIO

FIVE YEARS AGO the Peterborough Works of Canadian General Electric tackled the job of setting up a comprehensive plant engineering routine. It is still expanding its application. But in the gradual development of the procedures in use today it has established a sound foundation for improving the efficiency of this department.

Organization of the responsibilities and activities of their departments, most plant engineers will agree, is a good thing. More and more the proved management techniques for efficient manufacture of low-cost, high-quality products are being considered for equally valuable application in plant service departments.

To adopt this formula, however, is easier said than done. Because, when faced with the job of regimenting the duties of a plant engineering department into a standard pattern of operations, there comes the realization of a problem. How can the hundreds of complex and unrelated duties be charted for action and control without involving mountains of costly red tape? Is it possible to systematize and regulate the diverse functions of a plant engineering department with overall good results? Experience at Peterborough Works in developing and using its plant engineering procedures shows this kind of coordination can be achieved.

As usual, paperwork was a factor to be considered. Avoidance of red tape was a major concern in designing the paperwork. Even today care must be taken not to pile form upon form to get attractive refinements, lest the system become top-heavy. Held thus in check, whatever paperwork has been adopted is considered irreducible and as serving an irreplaceable function.

Three major divisions of paperwork were found necessary. They match the functional elements of departmental responsibilities of (1) administration of personnel, (2) installation of equipment, and (3) maintenance of equipment. Actually, as everyone knows, all three elements must be coordinated for a successful plant engineering program. With apologies, therefore, for what might seem like over-simplification of the many facets involved, these divisions can be said to be the broad outline of the problems that were solved by the new plant engineering procedures.

But first a brief picture of the plant to which these procedures have been applied will be helpful, if only to show the flexibility of their application. The Peterborough Works produces large generating equipment of all types, induction motors of all sizes, fractional-horsepower motors, switchgear equipment, and industrial control equipment. Also wire and cable, electric refrigerators, meters, and porcelain. Hence manufacturing operations are largely of the job-shop variety.

Total floor space of the plant is about 1,425,000 square feet. Total personnel averages about 4500. Total number of machines is almost 2000, with some 1500 motors from 1 up to 1000 horsepower.

Lest these statistics give the impression of a complicated set of plant engineering procedures, it is this plant's conviction that its procedure may be expanded or contracted to apply to a plant of multiplied area or of modest size. This is because only basic requirements without frills were kept in view.

Key to the smooth working of the entire program of the department is a loose-leaf instruction manual officially known as "Plant Engineering Instructions." At present its distribution has been limited to supervisors of all divisions of the department. Later it may be expanded to assistants, for self-evident reasons.

The purpose of the manual, in terms of its own foreword, is "to promote better coordination and also give . . . a better understanding of the responsibilities and aims of the plant engineering department." This it does, in principle, by defining all responsibilities of the various service organizations, and acquainting these units with all paperwork and procedures. Everyone knows what is expected of him. Everyone is told the essential details of what to do, and how to do it, whether it be purely administrative or functional in character.

This objective is demonstrated by the simple general index of the manual which shows only four main divisions of all its instruction sheets:—

a. General Department Routine .....73—(100-199)—1

b. Operating Instructions ..73—(200-399)—1

c. Installation Instructions ..73—(400-599)—1

d. Maintenance Instructions

(a) Electrical ..... 73—(600-899)—1

(b) Miscellaneous ..... 73—(900-)—1

The subject divisions at the left of this index are self-explanatory. The numbers at the right indicate by "73" a plant accounting number for this department. The second series of numbers, beginning with 100, 200, 400, 600, and 900, is signi-

PLANT ENGINEERING INSTRUCTIONS 73-111-1

Classification: **PLANT EQUIPMENT**

Subject: **MAINTENANCE DEPARTMENT RESPONSIBILITIES**

GENERAL

The maintenance division is held responsible for the following:

All alterations, additions, and maintenance in connection with buildings, offices, partitions, roadways, walks, lawns, and railway tracks

All construction, alterations, and maintenance of storage racks, bins, benches, tables, and fences. This applies to both wood and steel construction

All construction in connection with the excavation and erection of foundations, pits, and trenches

The maintenance division is responsible to the plant engineering department for all matters in connection with scheduling, specifications, working methods, costs, and procedures. All matters relative to wages, working hours, discipline, etc., should be referred to the mechanical superintendent

PLANT ENGINEERING INSTRUCTIONS 73-112-1

Classification: **PLANT EQUIPMENT**

Subject: **EQUIPMENT INSTALLATION DEPARTMENT RESPONSIBILITIES**

GENERAL

The equipment installation department is held responsible for the following:

The installation of all new plant equipment, except that constructed on site or installed by vendor. Work to include all secondary services feeders, erection, assembly, etc., except concrete foundations, bricklaying, and carpenter work

The transfer and reinstallation of all plant equipment. Work to include all secondary services feeders, erection, and assembly, etc., except concrete foundations, bricklaying, and carpenter work

All construction and maintenance of all plant equipment sheet-metal work

The equipment installation department is responsible to the plant engineering department for all matters in connection with scheduling, specifications, working methods, costs, and procedures. All matters relative to wages, working hours, discipline, etc., should be referred to the mechanical superintendent

ficant because it shows the type of instructions. The third number shows the issue,—"1" meaning the original issue, and "2" and up, the corrections.

Following the general index in the manual are four separate subindexes corresponding to the four main groups of instruction sheets. Contents of these groups, now to be described, will show their application and value.

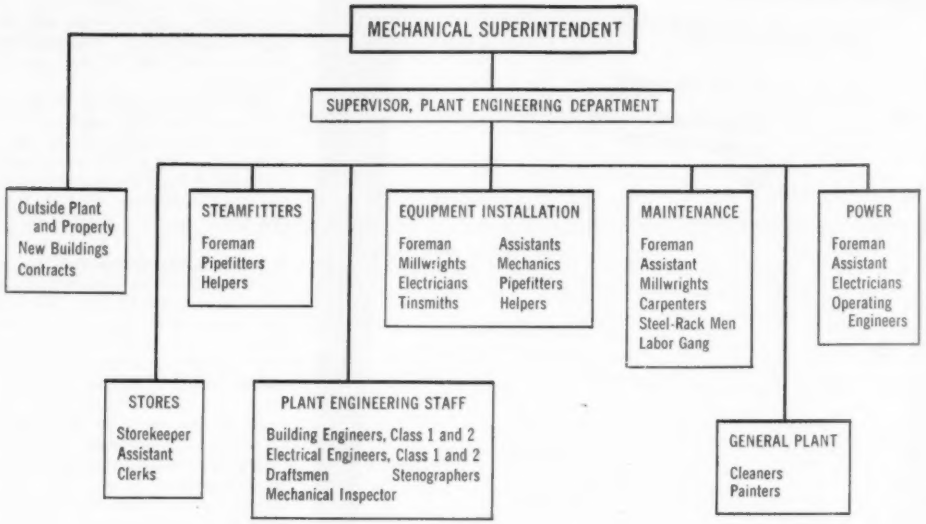
A. General department routine. At present this group contains 13 instruction sheets (100-113). The first four instructions deal with complete routines for issuance of shop orders and tool numbers, and the transfer and scrapping of equipment. In them explanations are made of the need for accounting for costs of maintenance, and for recording changes in departmental asset accounts. The next three sheets describe the functions of equipment record sheets and what data on equipment and renewal parts are to be compiled. More will be said of these and the next two sheets later. These two cover scheduling of routine maintenance work and plant installations.

The last five routine instruction sheets detail the responsibilities of the five major divisions of the plant engineering department. Typical sheets for the maintenance and equipment installation divisions are shown in Figure 1. They reveal a plan of organization generally dividing the responsibilities of maintenance and installation of plant equipment.

The organization diagram of the entire department is shown on page 140. The mechanical superintendent reports to the assistant works manager and is on the same level as the general superintendent, production manager, works accountant, and works engineer. All these men, plus the assistant general superintendent and works manager, comprise a "works committee" which is responsible for general manufacturing policies, industrial relations, and plant engineering. This committee approves all major projects for plant and equipment installation or repair.

The steamfitters division is responsible for installation and main-

1 RESPONSIBILITIES of each service unit are fixed by instruction sheets. Here, those for maintenance and equipment installation units



ORGANIZATION PLAN of the plant engineering department separates equipment installation from its maintenance. Engineering staff is planning and consulting group

tenance of (a) all primary steam, water, gas, and air distribution systems, (b) heating steam system, sprinkler and fire protection system, and (c) lavatories, sewers, and drains. In short, this division maintains all pipefitting work in the plant, and does all new work on general services.

The power division is responsible for installation and maintenance of all electrical generating equipment, power lines, substations, primary electrical distribution system and entire lighting system, also maintenance of all electrical equipment.

The plant engineering division is the planning and staff consulting group. Among its many responsibilities are plant layouts, cost estimates, requisitions and specifications for equipment, scheduling of work orders, equipment records, and administration of maintenance of all plant services and facilities.

B. Operating instructions. This section of the manual is intended to cover the highly technical precautions to be taken in the operation of such equipment as power generation and distribution, compressed air, steam generation, fire pumps, acetylene gas generation, and oxygen distribution. At present only one instruction, that on operation of the company's generating stations, has been issued. The others covering the full list of delicate plant equipment will follow.

Operating instructions for general manufacturing equipment in this plant come under the responsibility of the manufacturing foreman. Their inclusion is not contemplated in the manual at present.

C. Installation instructions. These sheets were set up for the purpose of covering instructions on standard or repetitive installations. Usually they are issued as drawings showing requirements for installation of service equipment, such as pressure reducing valves, unit heaters, centrifugal pumps, pressure gages, air surge tanks, and air lubricating and filtering devices.

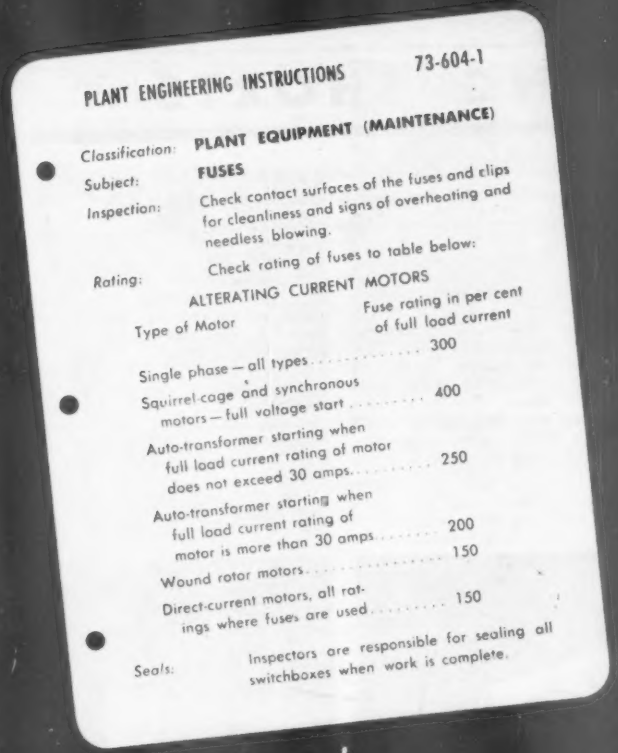
Some sheets are in tabular or graph form for subjects such as: Maximum allowable current-carrying capacity of conductors, number of rubber-covered conductors in one conduit, sheet gages for ductwork, hose sizes for pneumatic tools, and maximum safe loads for I-beams.

Another method being developed is the accumulation of photographs of approved installations in the plant to serve as a pattern for future installations of the same type. Also, some of the instructions have been extracted from business publications in the form of articles, sketches, etc., and compiled as a standard instruction, as was the one on ventilation of a degreaser.

Service divisions understand that wherever possible installations should conform to the standard instructions given in the manual.

D. Maintenance instructions. The sources of maintenance instructions, as well as many of the aforementioned data, have been the recommendations of the manufacturers of the equipment. These have been supplemented by plant experience and know-how. Progress in building up the file has been necessarily slow because of the care required in editing the instructions and to guard against omissions. Already the Peterborough Works has issued 35 such bulletins.

(a) Electrical. In this section are found comprehensive bulletins for servicing all electrical apparatus of any consequence. The index reads like a "Who's Who" in electrical distribution. There are separate bulletins for relays, wire and cable, lightning arresters, fuses, motors and generators, industrial controls, rectifiers, lighting, arc welders, battery trucks, transformers, capaci-



PLANT ENGINEERING INSTRUCTIONS 73-604-1

Classification: **PLANT EQUIPMENT (MAINTENANCE)**

Subject: **FUSES**

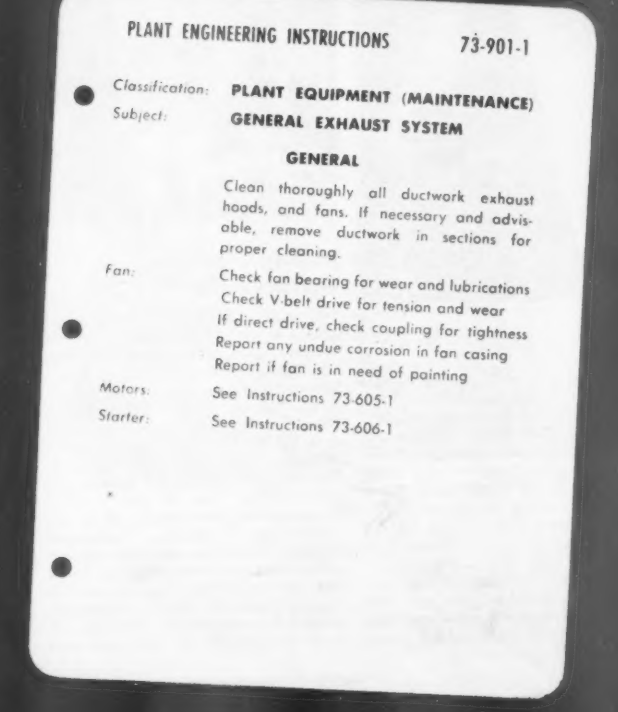
Inspection: Check contact surfaces of the fuses and clips for cleanliness and signs of overheating and needless blowing.

Rating: Check rating of fuses to table below:

ALTERATING CURRENT MOTORS

Type of Motor	Fuse rating in per cent of full load current
Single phase — all types	300
Squirrel-cage and synchronous motors — full voltage start	400
Auto-transformer starting when full load current rating of motor does not exceed 30 amps.	250
Auto-transformer starting when full load current rating of motor is more than 30 amps	200
Wound rotor motors	150
Direct-current motors, all ratings where fuses are used	150

Seals: Inspectors are responsible for sealing all switchboxes when work is complete.



PLANT ENGINEERING INSTRUCTIONS 73-901-1

Classification: **PLANT EQUIPMENT (MAINTENANCE)**

Subject: **GENERAL EXHAUST SYSTEM**

GENERAL

Clean thoroughly all ductwork exhaust hoods, and fans. If necessary and advisable, remove ductwork in sections for proper cleaning.

Fan: Check fan bearing for wear and lubrications
Check V-belt drive for tension and wear
If direct drive, check coupling for tightness
Report any undue corrosion in fan casing
Report if fan is in need of painting

Motors: See Instructions 73-605-1

Starter: See Instructions 73-606-1

2 ELECTRICAL EQUIPMENT maintenance is prescribed by bulletins or single-sheet instructions that leave no excuse for mistakes

tors, and power and air circuit breakers. Most of the electrical bulletins were adopted *in toto* from the company's own publications and given a serial number. Some subjects, such as fuses, were self-developed.

(b) Miscellaneous instructions. Proper maintenance of non-electrical service equipment is dictated in this section by bulletins ranging one-half to six pages in content. The section treats oil purifiers, electric and air hoists, ventilation units, centrifugal pumps, ovens and furnaces, and dehumidifiers. Other items are cooling tower fans, abrasive cleaning machines, resistance welders, spray booths, and general exhaust systems.

Wherever any service equipment comprises an assembly of machine units covered in other bulletins, such as motors and starters, the corresponding bulletin contains a cross-reference to the other instructions. Every effort is being made to present complete instructions so that no phase of maintenance will be overlooked.

Preparation of the "Plant Engineering Instructions" is obviously a continuing assignment. Its basic role in the efficient administration of the plant engineering personnel is felt to be well worth the effort. The advantages of standards and standing instructions have been put to work in its pages. With such a book of rules, flow of paperwork is smoother because better understood. Training of new men and supervisors is easier and more thorough.

Of the numerous benefits derived from the manual, probably the most enduring one has not yet been fully measured. This is the assurance of proper installation and maintenance of service units leading to their most efficient operation for years to come.

This is the first of three articles describing plant engineering techniques at Canadian GE. The second is scheduled to appear in an early issue.

3 MECHANICAL SERVICE equipment is covered by complete maintenance instructions for checking and servicing every needed part

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

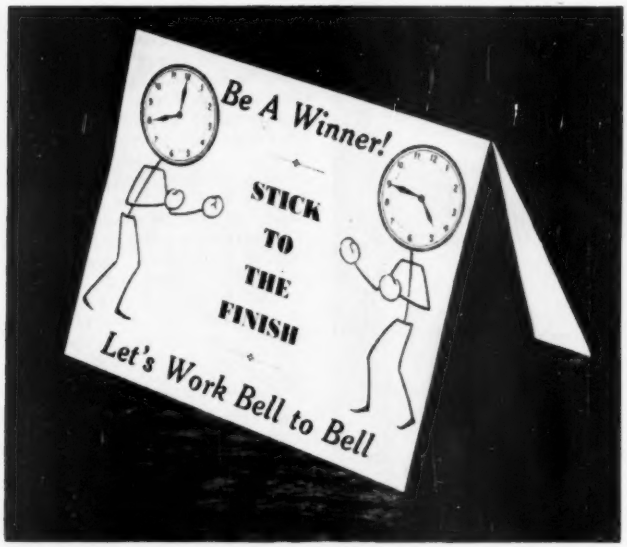
Meetings Aid in Planning Weekly Maintenance Work

JOHN M. WEBB, Manager of Maintenance Dept., Eli Lilly & Company, Indianapolis

Weekly maintenance meetings are held to aid in staff planning of current and future work at Eli Lilly & Company. Representatives from production departments are called in to these meetings to assist the maintenance department in making major decisions regarding plant changes or major new equipment.

These meetings are held once each week and usually run for an hour or longer, depending upon current problems. Typical of those attending are engineering staff men, pipefitting supervisors, machine, paint, and sheet metal shops, carpenters, production administration staff, electrical shop, and often representatives from plant layout or methods and standards divisions.

The meetings have paid off by achieving more common understanding among group members, and they have assisted the maintenance department in getting jobs done better and more efficiently.



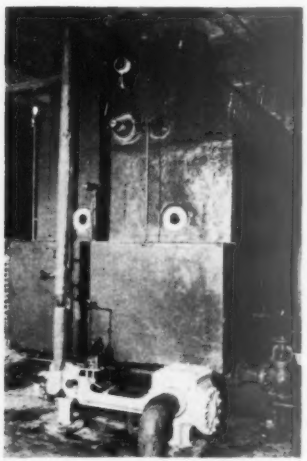
Slogans Promote Full Day's Work

W. H. Higginbotham, Rice-Stix Dry Goods Co., St. Louis

To discourage employees from making preparations to leave work as much as 25 minutes before quitting time, Rice-Stix employed several advertising techniques. The company used letters to supervisors, letters to employees in their pay envelopes, bulletin board notices, meetings with union representatives (who agreed to cooperate), articles in the company newspaper, and *desk cards carrying a campaign slogan.*

The slogan, "Let's Work from Bell to Bell," was adopted as the central point of interest of the three-month campaign, which was set up on a weekly basis. As it progressed, the value of the desk cards was immediately apparent. Changed periodically, 450 double-faced cards were placed on office employees' desks and on the tables in the cafeteria. Bulletin board notices and letters to employees were also changed to keep pace with the cards.

Results generally proved the program to be highly satisfactory, but it will be continued on a reduced scale to prevent back-sliding.



Insulation Improves Worker Comfort

Insulation of the "stick-water" evaporator in the Omaha plant of the Wilson Packing Company has been profitable in lowered room temperatures and faster cycle of operation. Beforehand, the room temperatures ranged in the 80's, and evaporation of a batch of stock water required 8 hours. Now the room temperature ranges 10 degrees lower, and evaporation time is less than 7 hours. Naturally, efficiency of the evaporator was similarly improved.

The insulation applied to the evaporator includes three kinds of insulation material. The basic coating is made of 1½-in. block designed for service at 1700 deg. F. Over the blocks is a ½-in. layer of

insulating cement. The top coat is a hard seal coating painted in glossy red, which is water repellent and washable.

•

ROLLING CHAIRS minimize fatigue in the pinion-cutting department of Hamilton Watch Company, Lancaster, Pa., where operators tend an average of six automatic bench machines. Comfortable chair with backrest is mounted on a four-wheeled platform that rides on a track flush with floor. Only a slight push is needed on the foot rail to roll the chair easily and quickly to any machine

•

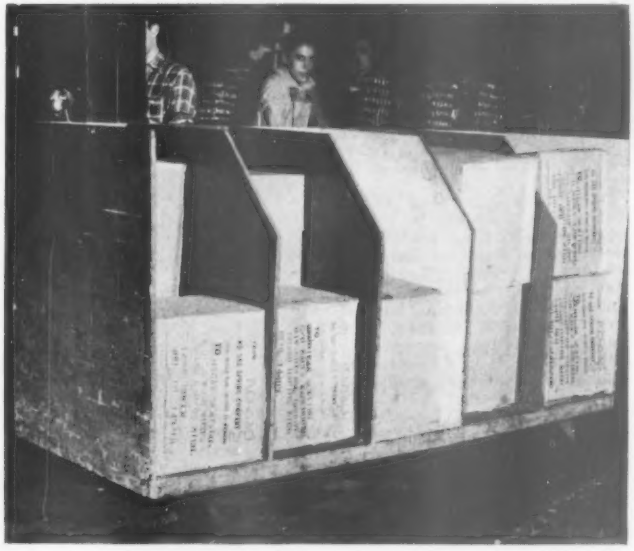
VISITORS making a plant tour at Oldsmobile Division, General Motors Corporation, Lansing, Mich., receive a "souvenir visitor's pass" as a reminder of their trips. Front of pass shows a photograph of the new Olds Futuramic car, and note on the back cites brief history of company

Conference Room Is Used By Everyone

A conference room so flexible that it can be used for almost any purpose, is provided at the truck and coach division of General Motors Corporation, Pontiac, Mich.

The room can be used as one large meeting room for management meetings, or divided into four different rooms by adjusting four folding partitions. A dead level floor area is adequate to hold any commercial bus or truck produced.

A wide panel around the wall is designed to allow the mounting of photographs, drawings, or other illustrative material for display or training purposes. A projection booth built in at one end of the room permits slide film or moving picture presentation. Ceiling drop poles (arrow) are provided for other special equipment and lighting arrangements required during conferences.



Truck Serves As Carrier And Stock Container

A sectionalized truck serves as the carrier from the receiving room and as a stock container for spring assembly in chair seats at American Seating Company, Grand Rapids, Mich. The truck is divided into five stock bin sections. Each section is identified by color: Green, blue, yellow, red, and white. The prime reason for painting the different sections in color is to identify the different sizes of springs used for the chair seat assembly.

Before, the various spring sizes were moved to the production operation in their original containers

by trailer train. It was necessary for the employee to check the description and identification on each package. This procedure was time consuming and often resulted in production errors.

With the sectionalized truck it is no longer necessary for the operator to make this selection. He merely takes the proper spring size from the proper bin in the truck. Workers are not required to learn the different specifications or sizes of springs. All they have to learn is where the different colors go in assembly.

•

Training Program "Sells" Motion Study Methods

Smooth introduction of motion study methods was largely owing to the establishment of a worker training program by Standard Telephones & Cables, Ltd., an English associate of The International Telephone & Telegraph Corporation. Possible prejudice against new methods was overcome in advance by demonstrating clearly to individual operators that they could work faster and accomplish more—yet expend no more, and probably less, effort.

To fulfill its training requirements, the company established a motion study laboratory, used not only for research but also for explaining the principles and objects of motion study to operators.

Under the guidance of an instructress, employees are given the opportunity to master the revised operation in the laboratory before the new method is installed in the shop itself.

Once management has decided that motion study can be applied to a particular operation, the engineer makes a careful analysis of the existing method. When all details are listed, he tries to evolve a new method, eliminating unnecessary movements, locating work trays and fixtures conveniently, and balancing body movements by calling for simultaneous use of both hands and the feet.

If possible, a rough mock-up of the proposed improvement is constructed and an estimate made to determine whether or not useful economies are likely to be achieved. If results are satisfactory, new tools and fixtures are delivered to the laboratory, and the instructress undertakes a trial run. Often she can then recommend modifications and improvements.

At this "trial" stage, the operator is transferred from the shop to the laboratory.

First, she is given a brief, informal talk about motion study. Its basic rules are explained, and a simple demonstration is made, with the operator trainee taking part in the action.

Once the operator is familiar with the fundamentals, she is introduced to her instructress, and her training is initiated. The training period varies with the adaptability of the trainee, and may extend to three weeks. If it becomes apparent that the trainee has no aptitude, or is being handicapped by physical defects, she is transferred.

At intervals, the employee is timed to check her proficiency and when she reaches her maximum efficiency, the rate setter is called in to set the new piecework price. The job is then put back in the shop—during a weekend, if possible, so as not to interrupt the worker's performance of the new operation.

Success in gaining employee approval can be attributed to the careful explanation of the new method's benefits, and also to close cooperation and consultation with shop supervisors.

CIRCULAR PARTS HOLDER makes work easier in the subassembly department at Marchant Calculating Machine Company, Emeryville, Calif. Sixty different parts make up this "selection unit," which takes two hours to assemble. Parts for one month's production are brought to the department and kept in trays behind the workbench. Assembly is done entirely from memory, and workers are not expected to hit the 2-hour quota until they have been on the job for six months

TOT NURSERY was a feature of open house day at the Shelvador plant of Crosley Division of Avco Manufacturing Corporation. Trained nurses, from regular plant staff, supervised and entertained over 700 youngsters while their parents viewed factory operations free from worry over unattended children and without the expense of hiring sitters

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

There's big news for fourth-round wage negotiators: BLS thinks living costs won't go any higher for six months. In fact, it looks for prices to drop.

If that's true, union leaders will have less than a five-point rise in the price index to back demands.

To catch the significance of this, you must look at how the first three rounds of pay boosts followed so closely the trend of the BLS consumers' index:

First Round: 18½ cents. (Index was up 15 points above the wartime Little Steel Formula level.)

Second Round: 15-cent package. (Index up 16 points.)

Third Round: 11-13 cents. (Index up 13 points.)

On the basis of a 5-point rise this time the big wage settlements next summer should be nearer the nickel level, with some fringe on top.

Says one White House adviser: "We are fast getting back to the day when a 3-to-5-cent pay boost will be a substantial and satisfactory raise."

Support for a 5-cent wage measure in 1949 should come from General Motors' two-year escalator contract. If the price index holds, GM wage rates will be 6 cents higher on the May 29 anniversary date. That figure includes 3 cents for standard-of-living improvement.

But last May GM workers won only 11 cents, two less than their fellow union members in other auto plants. So other auto workers would need only 4 cents this year to catch up with their GM brothers.

•

With living costs stable, union negotiators will shift their tack. They'll cite 1948's record profits and rising productivity. And they'll argue for welfare benefits when they can't make a good case for higher pay.

But this looks like the year when wage "patterns" will be less stylish. Profits will vary by industries and by employers within industries. Many a business will not make profits, many employees will go without wage hikes.

Already we are running into layoffs in shoes, textiles, clothing, home appliances. That eases wage pressures. We're even getting serious demands for wage cuts in the shoe industry, the first since prewar.

John L. Lewis doesn't want a drop in coal business to be used by coal operators to cut wages by selected mine closings. He will invoke his own plan: spread the work with a shorter week for all miners.

A shorter week is in store for railroad workers. They put in 48 hours without overtime pay because they don't come under wage-hour law. Truman's emergency board for non-operating employees urges a 40-hour week next fall, at same pay. This would spread to other railroad hands.

Two significant aspects of the recommendations:

1. It brings another large group of workers under the 40-hour week.

2. The 7-cent hourly raise (third round) comes pretty close to what we guess for the fourth round.

•

Who will lead the way on the fourth round?

First up will be the left-wing CIO electrical workers at Westinghouse and General Electric. It can reopen April 1. Unless it takes a soft settlement, this union will stall, wait for Taft-Hartley revision.

Next, Chrysler, on June 15. The CIO auto workers struck Chrysler last year, as they did GM in 1945. So, if the going is tough, the job may be handed to the union's Ford members. That would come July 15.

Ford makes a good target. Henry Ford, 2d, is on record: A wage increase is "probably inevitable."

Meanwhile, CIO President Philip Murray will be talking with U. S. Steel during July. Steel could break the ice if the others don't. It did in 1946.

Actually, Lewis is in the best position to lead the way. That's if you look only at the timetable. His coal pact expires June 30, but he can open it earlier.

Other factors would exclude Lewis as the pattern-setter: Coal business is slipping, and the miners are at ceiling on wages and welfare benefits.

What Lewis really wants: a 30-hour week. That might fit the coal industry, where demand is down, but not steel and autos.

Labor's political leaders will work hard on the 81st Congress to line up support for Truman's legislative proposals. Truman will rely on them for big help.

AFL's legislative agents—from all AFL unions—will meet monthly, pressure key Congressmen.

CIO top officers have taken over legislative activity previously handled by staff workers.

Look for Congress to kill "overtime on overtime." The Labor Department has a bill ready; the AFL is prepared to back it.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

The boom promises to carry on well into 1949—in spite of conspicuous sagging in some lines.

Production and employment are likely to continue at a high level through the first half of the year. Demands of the military and foreign aid programs are rising now. They will not reach their planned peaks until well into the year. The steel industry, which has been producing at 100 per cent of capacity, sees no let-up in its orders. *Automobile makers hope to increase production in '49 if they can get enough steel.*

Industry plans now to continue its investment in new plants and equipment at close to 1948's record-breaking pace. That's the preliminary conclusion of McGraw-Hill's 1949 survey of capital expenditure prospects. Spending for plants and equipment could turn down later in the year, of course. *A heavy excess profits tax, for example, would soak up funds business is using to pay for its new facilities.*

Construction has in prospect its biggest peacetime year. Homebuilding may slow down. But plans for increases in commercial building and in public works indicate that 1949 will be as big, if not bigger, for construction as a whole than was 1948.

Retail lines have ample purchasing power behind them. The pre-Christmas let-up in buying suggests that customers are looking for better values now. Probably, too, many lines will have to adjust to real buyers' markets in '49. But people's incomes are increasing, seem headed for new records in the months to come. That should carry retail trade as a whole on at a high level—even though some lines gain while others slip.

All this adds up to the fact that: Business seems to have enough momentum to keep it rolling in high through the first half of 1949—say, until Labor Day.

•

What happens after that will depend heavily on political events. Major political developments could change the business outlook overnight. If, for example, the Kremlin forces the U.S. to add $5 billion or more to the military and foreign aid budgets now in sight, we shall have another dose of inflation. Almost certainly price control and materials allocations would be restored. *Or, if the Russians suddenly become persuasively peaceful, the outlook would again change.*

On the domestic front, government has the power to make or break business in 1949.

In 1946 and '47 business boomed no matter what government did. Last year Congress did strengthen the boom—by voting the tax cut, increased military spending, and the European Recovery Program. But in 1949, with the economy balancing between inflation and deflation, business will be very sensitive to government action. Sharply increased taxes on business, for example, could lead to a general setback by blighting industry's expansion program.

Even if major developments of this sort do come off, however, business won't feel their impact until later in the year. They might produce a slowing down in the second half. However, even now business must recognize that it is operating in a climate that can be drastically influenced by government.

•

The "good business" in prospect for 1949, moreover, won't be like the good business industry looked forward to a year ago. Inflation is petering out. True, full employment and high production make a fourth round of wage increases likely. That will mean higher costs and higher prices in some industries.

But, while industrial prices rise slowly, other prices —food and apparel, for example—seem headed down. The rise in industrial prices will roughly balance these declines. That means the average of all prices should be stable.

However, there's one field in which price controls and allocations may be clamped down. That field is metals. Military orders, the stockpiling program, and foreign recovery orders are putting heavy pressure on aluminum, copper, steel, and zinc. All the signs are that this pressure will increase in the first half of the year. With industry also not sure of its supplies, the Administration's answer is likely to be more controls.

Aside from the metals, however, "good business" does not mean another year of all-out boom. Good business in 1949 promises to be like good business in the mid-1920's.

The economy as a whole will be steaming ahead, but some lines and many companies are likely to find the going rough. But there's still plenty of room for old-fashioned prosperity.

More and more lines will find they're once again up against real competition. But as manufacturers and distributors pare costs and prices—and price adjustments spread from soft goods to durables to construction—volume and employment should hold up.

Barring war or unexpected calamity—1949 should see business carry on in high gear. Even if it slows down in the second half, 1949 promises to be racked up as another year of extraordinarily good business.

USERS EXPRESS PREFERENCE FOR Exide IRONCLAD BATTERIES

Electric industrial truck users have frequently expressed a preference for Exide-Ironclad Batteries . . . the batteries that assure peak performance day after day.

Such overwhelming preference for the Exide-Ironclad Battery is based upon user experience. This unique battery has, during the past 35 years, proved itself to be a thoroughly dependable, safe and efficient power source for all makes and types of electric industrial trucks.

Different from all other batteries in construction as well as in performance, the Exide-Ironclad possesses ALL FOUR of the essential characteristics demanded of a battery for electric industrial truck service—(1) high power ability, (2) high efficiency, (3) great ruggedness, and (4) long life. These characteristics are due to the special construction of the Exide-Ironclad Battery, especially its rugged, tubular positive plate.

Write for further particulars and FREE copy of Exide-Ironclad Topics, which covers latest developments in material handling and shows actual case histories.

1888...Dependable Batteries for 61 Years...1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

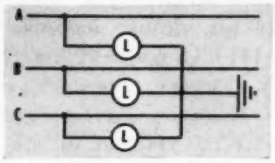
maintenance data sheet

157

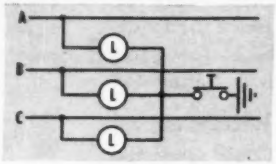
The first two of these four data sheets were published in the December, 1948, issue, on pages 132 and 134

GROUND DETECTORS FOR ELECTRICAL DISTRIBUTION SYSTEMS

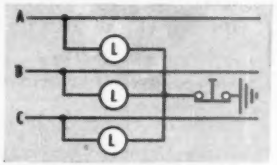
Ground Detection Methods for Ungrounded Three-Phase A.C. Systems Up to 600 Volts



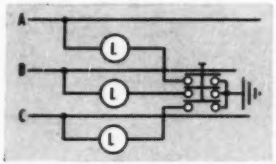
1. All lamps normally burn dimly. Two bright and one dark lamp show a ground. The dark lamp indicates the grounded phase



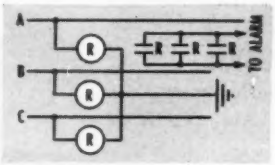
2. If a ground exists two lamps will be bright, the other dark, when the pushbutton is depressed. The grounded phase is indicated by the dark lamp



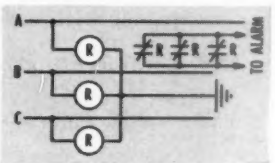
3. If lamps indicate a ground, depressing the pushbutton will cause them to burn dimly, thereby checking the indication



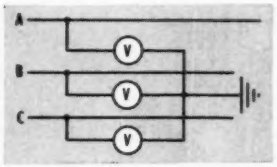
4. A pushbutton with normally open contacts is used here. The lamps normally are dark



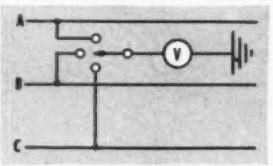
5. Overvoltage relays are used. When a ground develops, the relays in the ungrounded phases close their contacts, to actuate an alarm



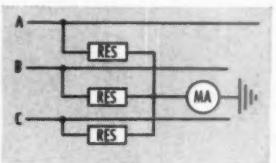
6. With undervoltage relays, a ground causes the relay in that phase to lose its voltage and sound the alarm



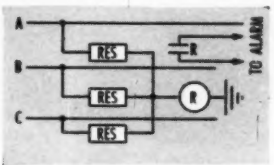
7. When voltmeters replace lamps a lower than normal reading on one indicates a ground on the corresponding phase



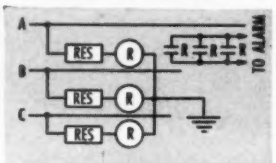
8. This scheme makes use of a three-point switch and a voltmeter. A phase that is grounded will show a lower reading than the others



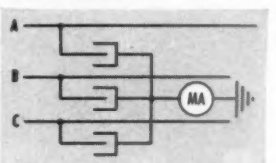
9. A milliammeter will indicate the flow of ground current, but will not show on which of the phases the ground exists



10. Here a current-sensitive relay replaces the milliammeter in Figure 9. A ground on any phase will cause the relay contacts to close and actuate an alarm



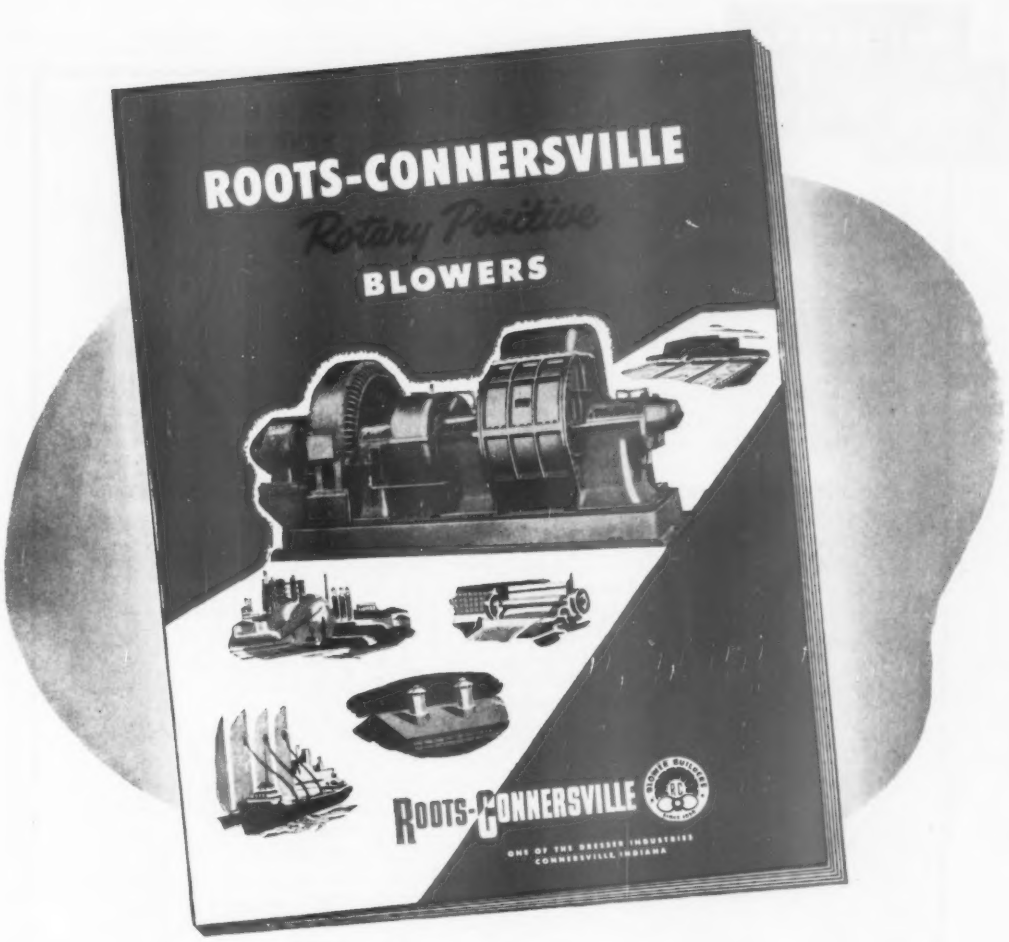
11. Three similar current relays with their contacts in parallel may be used to actuate an alarm if a ground develops on any phase



12. Capacitors may be used with a milliammeter to indicate flow of ground current from a fault on any phase

CONTINUED ON PAGE 150

Prepared by R. Loewe, Allis-Chalmers Manufacturing Company, Milwaukee



NOW READY... for immediate use or for your blower files

BASIC INFORMATION AT YOUR FINGER TIPS

Characteristic curves, covering capacity and horsepower, under various operating conditions.

Details of operating principles, design and construction.

Illustrations showing extensive applications of R-C Blowers in widely varying industries.

Other helpful data and information for your blower files.

If you use blowers, you need the essential data in this new, informative booklet on Roots-Connersville Rotary Positive Blowers.

The material contained will help you in selecting the right blower to meet your specific requirements—based on almost a century of specializing in blowers. Ask for Bulletin 22-23-B-13. No cost or obligation.

ROOTS-CONNERSVILLE BLOWER CORPORATION
901 Central Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER BUILDERS R-C SINCE 1854

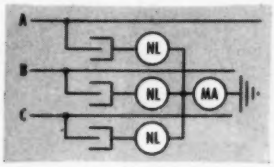
BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

★ ★ ONE OF THE DRESSER INDUSTRIES ★ ★

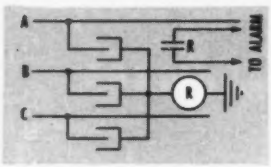
maintenance data sheet 158

GROUND DETECTORS FOR ELECTRICAL DISTRIBUTION SYSTEMS

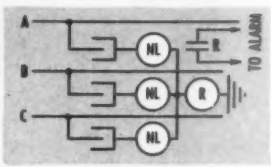
CONTINUED FROM PAGE 148



13. The combination of three neon lamps and a milliammeter will indicate flow of ground current and show the faulty phase by a dark lamp

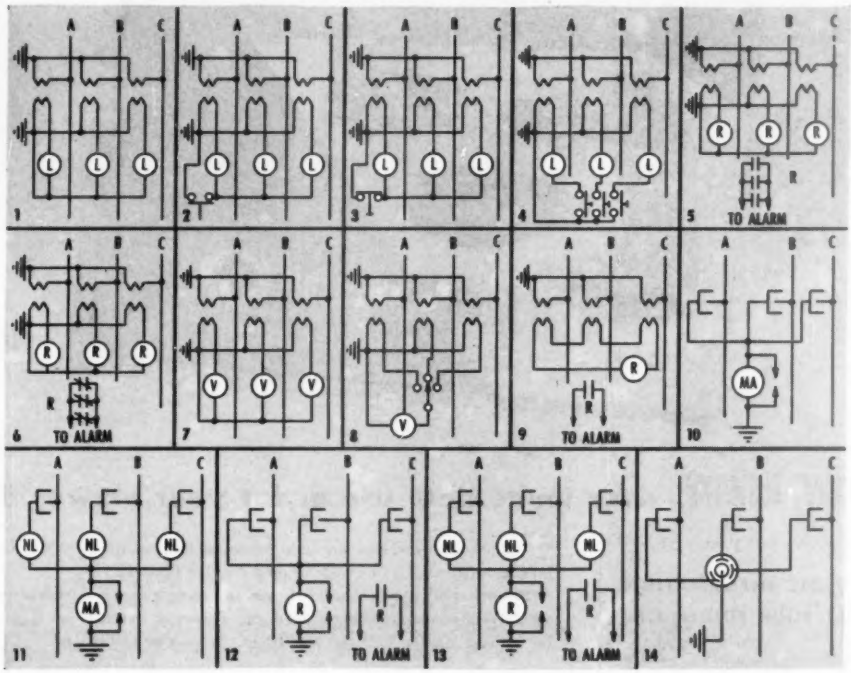


14. A current-sensitive relay and capacitors are used in this scheme to actuate an alarm if a ground develops on any phase. The faulty phase will not be indicated



15. In this arrangement the milliammeter in Figure 13 has been replaced by a current-sensitive relay, which actuates an alarm when a ground exists on any phase

Ground Detection Methods for Ungrounded Three-Phase A.C. Systems Over 600 Volts



On high-voltage systems the phase voltages may not be applied directly to the ground detection equipment. Therefore potential transformers or capacitors are used.

The schemes illustrated in Figures 1 to 8 inclusive are similar to those described for low-voltage systems, except for the addition of potential transformers.

Figure 9 shows a system in which the transformer secondaries are connected in delta, with an overvoltage relay closing one corner of the delta. Normally the three secondary voltages will add up vectorially to give zero voltage. A ground on any line will cause the corresponding secondary voltage to disappear.

The schemes shown in Figures 10 to 14 inclusive utilize capacitor coupling instead of potential transformers. With the exception of Figure 14 these schemes are similar to those for low-voltage systems save for cutouts.

The scheme shown in Figure 14 uses an electrostatic detector. A movable, centrally located vane is normally held by electrostatic attraction in a center position. If a ground occurs this movable vane will move away from the fixed vane connected to the grounded phase.

Prepared by R. Loewe, Allis-Chalmers Manufacturing Company, Milwaukee

Take advantage of HYATT Experience

As builders of the first, and today the finest roller bearings, Hyatt, in more than half a century, has accumulated a lot of application experience which should be helpful to you.

Hyatt engineers are at your service, glad to assist you in solving your bearing problems whether you are designing a new machine or piece of equipment or modernizing an existing design.

Hyatt Roller Bearings are used by thousands of leaders in the automotive—industrial—agricultural—petroleum—construction and transportation fields. Costs you nothing to invite a Hyatt man to confer with you. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT

Briefed here—for the convenience of plant operating men—are descriptions of industrial plant equipment newly placed on the market

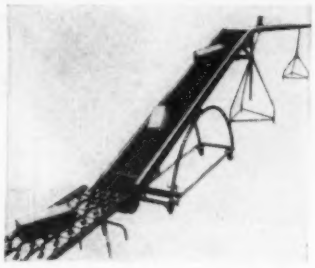
Belt Conveyor

Featuring an angular hump, belt conveyor, with "Pakaged" power unit has snub with rollers that are independently adjustable both vertically and horizontally. Manufacturer states that the power unit contains its own take-up, and is adaptable to drive at either end or at any point along the incline. Island Equipment Corp., 27-01 Bridge Plaza North, Long Island City 1, N. Y.

•

Belt Dressing

Suitable for use on leather, canvas, or rubber belting, dressing, called Beltlube, has a neatsfoot oil base, with other ingredients added to promote penetration and to provide a gripping surface. Manufacturer states that it will not cake or gum. Available in 1-qt., 5-gal. cans and 50-gal. drums. Alexander Brothers, 406 North Third St., Philadelphia 23.



Portable Power Boosters

For use in conveyor systems to maintain a continuous flow of material, portable power booster is available with belt widths of 8, 10, 12, and 14 inches. Hand wheel is used to select degree of incline. Equipment includes a 1/3-hp. 110-volt 60-cycle single-phase motor, floor locks, and four heavy-duty casters. Frame of standard model is 10 feet long; special lengths and equipment to meet unusual requirements are available. Sage Equipment Co., 30 Essex St., Buffalo 13.

•

Gas-to-Oil-Burner Converter

Suitable for converting ovens, furnaces, and boilers now fired with gas to the use of oil burners, device, called Oiltogas Converter, supplies high temperature air to the point in the piping where gas and air ordinarily are mixed. At the same point, it introduces atomized oil into the hot-air stream, which vaporizes and burns in any type of gas burner in the same manner as gas, claims its maker, who states that existing gas burners and piping need not be altered. Converter will vaporize and burn Nos. 1, 2, or 3 oil without forming carbon or condensate. System is automatic and includes flame safety devices. Unit consists of one air heater assembly and as many insert assemblies as desired, making multiple zone control possible with no change in firing technique. Units are available in 1-, 2-, 4-, 6-, and 8-million Btu. capacities. North American Mfg. Co., 4455 East 71st St., Cleveland 4.

•

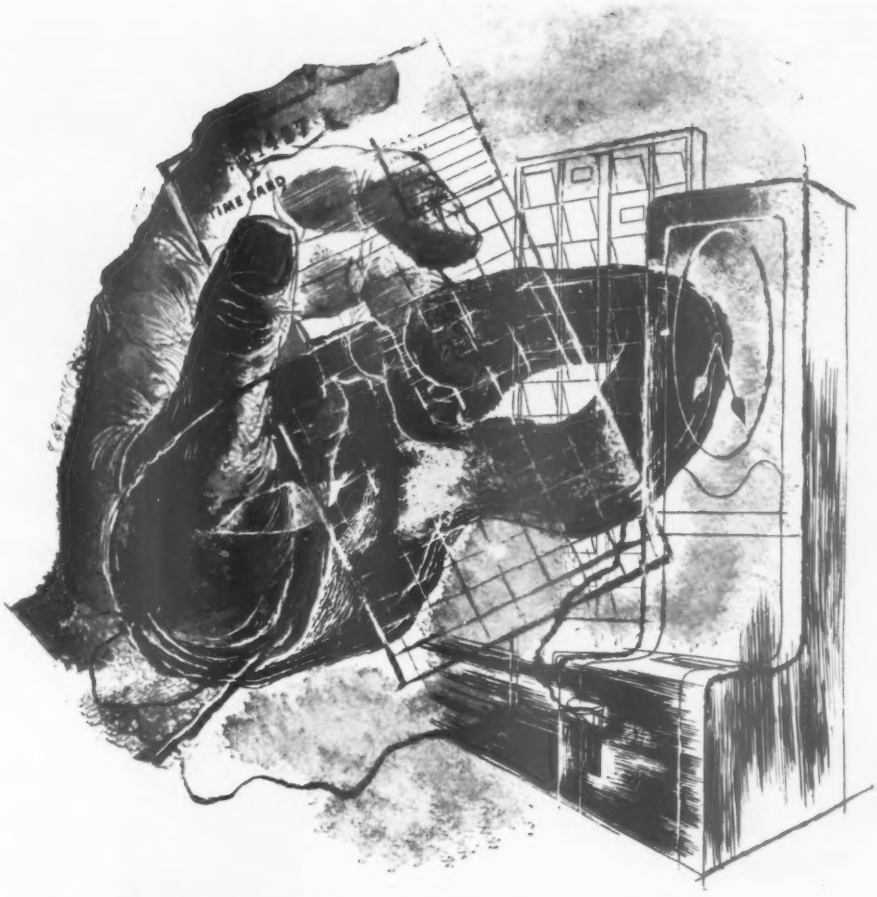
Snow Removal Device

Device that scoops the snow from sidewalks and driveways and blows it out of way consists of a reversed wedge-shape scoop equipped with a snow-chopper screw conveyor which carries the snow to a fan. The fan in turn blows the snow through spouts either to right or left, clearing a path 3 feet wide. When the machine is run into a snow bank and there is any tendency for the snow to "jam up," pressure on a lever, called the "incher," stops the forward progress of the snow blower without stopping the snow-chopping conveyor or the fan. Since both the conveyor and the fan run at the same speed, approximately 1500 r.p.m., there is no tendency for the snow to jam the fan. The scoop, snow-chopper conveyor, fan, and spout are counterbalanced to the rear of the single wheel by a weight, which facilitates handling during operations. Device is guided by handle bars, with motor controls located on the handles, and gear and "incher" controls within easy reach of the operator. Rototiller, Inc., 102nd St. & 9th Ave., Troy, N. Y.

A.C. Magnetic Starters

Designed for starting and protecting motors up to 50 horsepower, line of a.c. magnetic starters is furnished in all NEMA sizes from 0 through 3, with contactors in sizes from 00 through 3. They feature a one-piece plastic-encased coil enclosure which protects the windings against dirt, moisture, or possible damage during installation. Clamp-type coil terminals are embedded in this enclosure to prevent loosening.

Silver contacts are removable and interchangeable without use of special tools. An arc shield of cold-molded asbestos is said to prevent



Is this PROFIT THIEF on your payroll?

He's a slick operator. He's at work on machines in plants all over the country retarding production, eating away at profits, costing industry enormous amounts that *can* be saved!

Not in *your* plant, you say? Why not have a look? Today!

Are you still scooping grease from drums to guns with antiquated paddles? There's your profit thief at work—wasting time, wasting grease, risking dirt and contamination.

You can save 3¼ man hours for every 100 lbs. of grease.

Are you lubricating machines by hand—the old, time-wasting, risky, hit-or-miss method?

You can save up to 23.9 man hours in *applying* each 100 lbs. of grease.

Are you paying the price of "down-time" and lost precision for lack of the right grease at the right time?

You can make lubrication foolproof—make sure every bearing gets the right grease in measured amounts every time—even lubricate hundreds of bearings from one central point—while machines continue to produce.

How about it? Is this profit thief loose in *your* plant—on *your* payroll?

His label is "faulty, old-time, costly lubrication methods." Methods that are adding staggering sums to the already high cost of production.

There's one proven way to stop this loss.

An Alemite representative can tell you in 10 minutes how Alemite Methods will simplify and better organize your lubrication procedures. He can show you how mechanized lubrication from barrel-to-bearing will increase your production and profits.

Telephone your local Alemite distributor—or write to Alemite, 1870 Diversey Parkway, Chicago 14, Illinois.

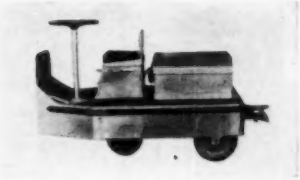
ALEMITE

Division of STEWART WARNER

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS

arc-over between contacts. Silicone steel magnet, with permanent air-gap, provides quick dropout. All steel parts are zinc plated. Available either open or mounted in general-purpose, watertight, dust-tight, or hazardous-atmosphere enclosures. General Electric Co., Control Div., Schenectady 5, N. Y.

•



Towing Truck

Electric-powered towing unit, said to be capable of hauling six times its weight in trailer loads, is designed to push as well as to pull. Called the Blue Tow Unit, Model BT, it features a heavy snub nose for pushing and a guard rail to protect the driver's feet and legs. Speeds are 6 or 8½ m.p.h., with four intermediate forward and reverse speeds. Unit is powered by either a 24- or 32-volt battery, depending on the speed and drawbar pull required. Over-all length is 77 inches, including rear hitch; wheel-base is 30 inches. Rocky Mountain Steel Products, 1361 Wall St., Los Angeles.

•

Floor Drains

Suitable for either new or old construction, drains are adjustable to floor levels by loosening the locating bolts on the frame, raising or lowering frame and grate to desired level, and tightening the bolts. All adjustment is on the inside of the drain; there is no necessity for disturbing pipe connections. Model Z-507 is designed with a non-tilt supporting ledge for the strainer. Model Z-506 is fitted with an extra-heavy deep-flange strainer for heavy traffic loads. Both are available in a complete range of sizes, with heavy-duty dura-coated cast-iron body and integral seepage pan, frame, and grate. Dept. Z-3, J. A. Zurn Mfg. Co., Erie, Pa.

•

Light-Duty Cleaner

Hand-type light-duty cleaner is suitable for removing dust and dirt from machines, overhead pipes, and walls. Standard model includes a blower nozzle; other attachments are available for vacuuming, spraying, and drying. Unit has a ½-hp. continuous-duty universal motor with permanently sealed ball bearings. Air velocity at the blowing nozzle is 18,000 f.p.m.; suction air volume (1½-in. hose) is 120 c.f.m.; water lift, 28 inches. Device weighs 8¼ pounds without cord. Ideal Industries, Inc., Sycamore, Ill.

•

Neoprene-Covered Flexible Metallic Conduit

Flexible-shielding metallic electrical conduit, neoprene-covered, is called Flexpansion. Maker states that the covering eliminates danger of damage to wire by action of oil or grease, and that conduit and couplings are liquid-proof, air-tight, and chemical resistant. Applications include machine-tool wiring, chemical plant wiring, underground conduits, and other uses where standard electrical conduit proves impractical. Techniflex Corp., Flexpansion Div., 55 Jersey Ave., Port Jervis, N. Y.

•

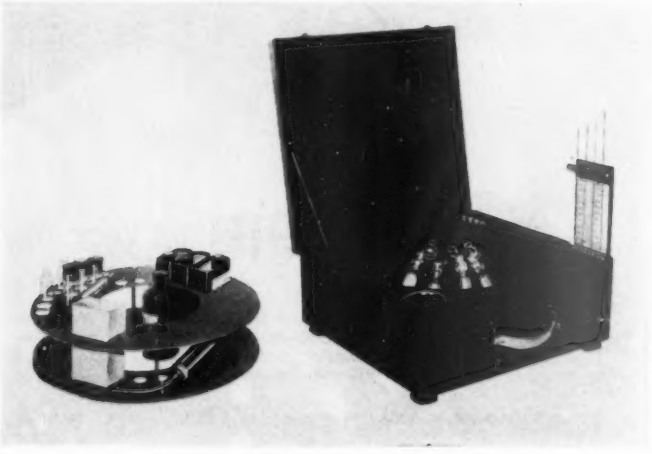
Sponge-Rubber Mats

Mats and runners, made of sponge rubber ½ inch thick, 21½ inches wide, and either 23 or 47 inches long, have beveled edges and are available in black or green, with other colors on special order. According to the manufacturer, use of mats helps to reduce worker fatigue, reduces floor noise and breakage, and promotes safety and employee goodwill. Atlas Sponge Rubber Co., 806 East 61st St., Los Angeles 1.

•

Hand Fire Extinguisher

Portable, pressurized 16-oz. fire extinguisher is hermetically sealed and needs no refilling or inspections, according to its maker. When the trigger is pulled, a pressurized stream is directed at fire as far as 18 feet away. Wall bracket is supplied, but

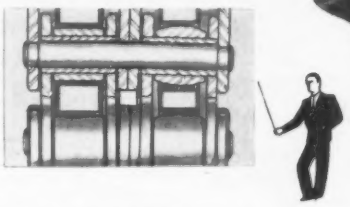


Portable Lubricating-Oil Testing Kit

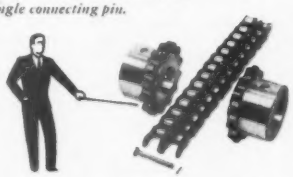
To provide means for determining the condition of lubricating oil, portable oil testing equipment kit is said to obtain accurate results even when used by relatively unskilled employees. It measures the four dangerous classes of contaminants: Change in viscosity due to fuel dilution or other causes; amount of the asphaltic and other oil breakdown substances considered responsible for deposits; amount of dirt, metal particles, other solids, and water; and acidity, showing whether corrosion is possible. According to the manufacturer, oil from four engines can be analyzed for all four classes of contaminants in 25 minutes to detect changes and trends which might result in mechanical or operating troubles. Tests also serve as a guide to making oil and filter changes according to actual conditions, instead of according to time or mileage. Kit includes fuel dilution indicator and a centrifuge head, which accommodates eight tubes. Center section is removable to allow free access to equipment. Gerin Corp., Red Bank, N. J.

this Coupling gives you *True flexibility* without backlash!

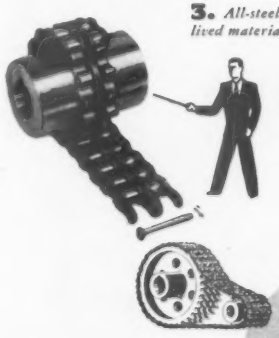
1. *True flexibility...maximum shock-absorbing ability because pins bend.*



2. *Easily installed or disconnected with single connecting pin.*



3. *All-steel. No short-lived material.*



● Baldwin-Rex Tru-Flex Couplings give you true flexibility without destructive backlash. These efficient chain couplings with their exclusive convex rollers on one chain strand give you better all-round performance . . . more protection for your machines . . . longer service. Here's why:

The convex rollers maintain only line contact with sprocket teeth and because of this contact, pins are designed to flex or bend. The flexing of the pin, plus the inherent flexibility of roller chains, accommodates misalignment, allows end play, and absorbs greater torsional shock loads. Too, this design permits the chain to be fitted snugly around the sprockets as contrasted to the "sloppy fits" of ordinary chain couplings. This, plus the fact that no short-lived materials are needed to give flexibility, makes it easy to see why Tru-Flex Couplings will give you longer, more efficient service.

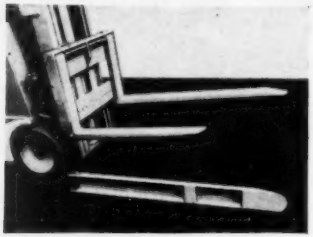
For all the facts on Tru-Flex Couplings . . . how their single pin construction makes installation and disconnecting easy without an axial shift of either shaft . . . how they dampen pulsating loads . . . and their many other features, send for your copy of Bulletin No. 486. Address Baldwin-Duckworth Division of Chain Belt Company, 327 Plainfield Street, Springfield 2, Mass.

BALDWIN·REX

ROLLER CHAIN COUPLINGS

it can also be carried in tool kit. Extinguishing fluid contains 90 per cent carbon tetrachloride and 10 per cent other chemicals, with carbon dioxide as a propellant. It is not injurious to persons or materials. Suitable for use on gasoline, fuel oil, paper, grease, electrical, and other types of fires. Bostwick Laboratories, Bridgeport 5, Conn.

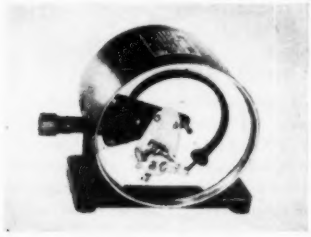
•



Slip-On Fork Extensions

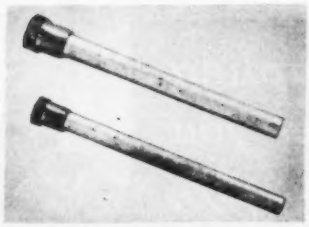
Line of slip-on fork extensions of welded steel is available for use on manufacturer's Standrive power fork trucks to make possible the handling of different lengths with the same truck. Available with tapered ends for handling rolls, standard ends for picking up pallets, chisel ends for handling bagged or other lose material, and others. Attachment is accomplished by slipping the extensions over the regular forks and locking them at the heel of the fork by means of stud and latch. Lewis-Shepard Products, Inc., 271 Walnut St., Watertown 72, Mass.

•



Electronic Pressure Transmitter

Device, called the Microsen Pressure Transmitter, is said to pick up pressure motion from the tip of a Bourdon tube, and by means of an electromechanical relay, convert it into a d.c. signal which can be indicated or recorded with milliampere or multivolt instruments. Since the electrical output is directly proportional to the movement of the Bourdon tube, uniformly graduated scales are used. Power consumption is 2 watts. Base is of cast aluminum, dust- and vapor-proof, with screwed-on covers. Standard pressure ranges up to 50,000 pounds are available. Operating voltage is 115 volts at 50-60 cycles. Suitable for use with hydraulic apparatus, processing equipment, or flow and liquid-level indicators. Manning, Maxwell & Moore, Inc., 11 Elias St., Bridgeport, Conn.



Corrosion-Inhibiting Zinc Rods

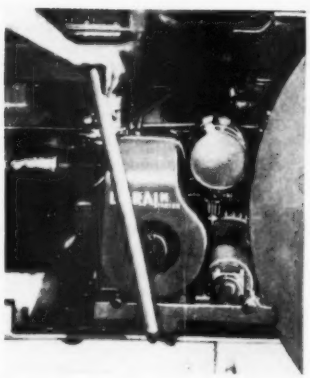
Zinc rods, called Cor-In corrosion inhibitors, are fitted with standard pipe-plug ends, which may be screwed into heat exchangers, piping, or hydraulic equipment to protect against corrosion. Rods are available in $\frac{3}{8}$-, $\frac{1}{2}$-, $\frac{5}{8}$-, $\frac{3}{4}$-, and 1-in. diameters, in lengths up to 12 inches. Manufacturer states that they may be used as both new and replacement equipment for most makes of diesel engines, for refrigeration equipment, radiators, water and oil coolers, heaters, and other units subject to corrosion. They may be renewed by unscrewing used-up zinc rods and screwing in new ones. Rotometals, Inc., 980 Harrison St., San Francisco 7.

•

High-Pressure Steam Hose

Oil-resistant high-pressure steam hose is designed to withstand the deteriorating effects of combined steam and hot oil which occurs when lubrication is applied to pile-driving tools through steam pressure lines. Its braided wire construction is said to provide high bursting strength, and to act as an armor to withstand external abuse. Constructed of a rubber core, two or three plies of braided steel wire, depending upon the diameter of the hose, one ply of asbestos cord, and a heat-resistant rubber cover. U. S. Rubber Co., Rockefeller Center, New York 20.

•



Friction-Drive Engine Starter

Self-powered, friction-drive starter for diesel or gas engines, known as the Lorain, can also be used on any horizontal or vertical type engine having an exposed flywheel, according to the manufacturer. It is powered by an air-cooled, single-cylinder gasoline engine with 4-brake-hp. output. This drives a plastic friction pulley through a chain and sprocket reduction gearing system. When installed on the diesel or gas engine, the pulley contacts the rim of the flywheel when the throw-in throwout lever is operated, bringing the engine up to speed, and disengaging the starter. Over-all dimensions of the starter are 18x24x21 inches. White-Roth Machine Corp., Lorain, Ohio.

•

Paint-Brush Safe

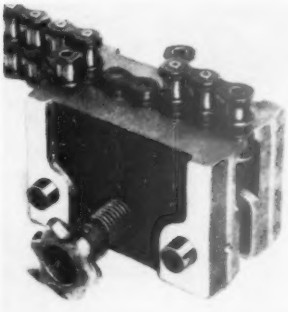
Sealed, all-aluminum container, designed to suspend paint brushes at the correct depth in individual compartments holding paint solvent or preserving fluid, may also be used as a carrying case, which can be locked to avoid tampering and theft. Waste-compartment, provided with a wringer attachment to extract surplus paint or preserving fluid, is removable for draining and cleaning. It can be placed in any position within the safe. Movable brush clips in the individual storage compartments permit storage of brushes of varying dimensions. Each storgae compartment is removable. Y & N Mfg. Co., Wooster, Ohio.

•

Intercommunication System

For use in high-noise-level areas, intercommunication system combines a trumpet-type paging reproducer and a 2-way staff station for use in either intercommunication or sound systems. When the system is used to page a person, message is reproduced at high volume through the trumpet station. To reply, the person depresses a lever on the nearest staff station, which automatically cuts out the trumpet, permitting 2-way conversation at normal voice level. Executone, Inc., 415 Lexington Ave., New York 17.

•



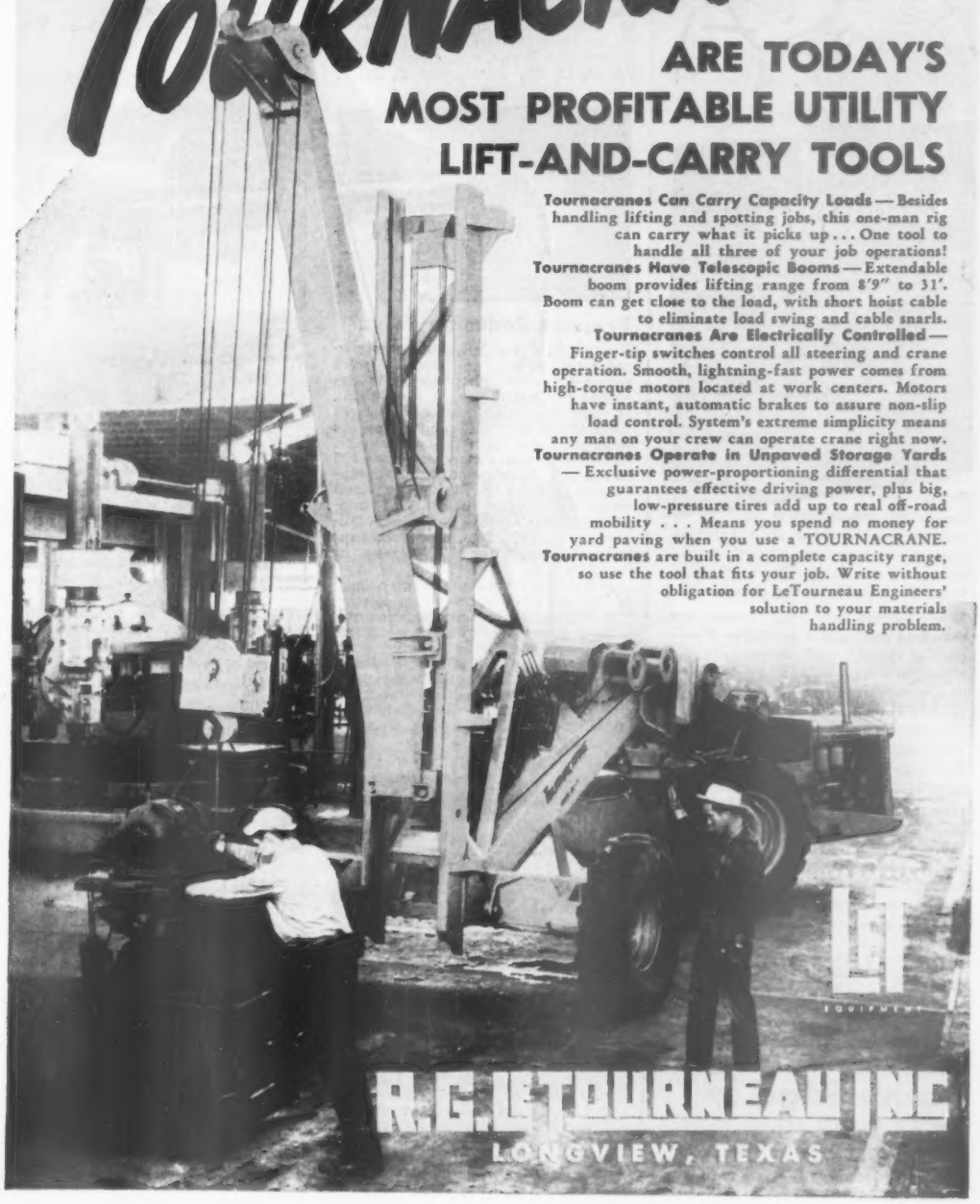
Chain Vises

Designed to simplify the process of taking roller chain apart, two chain

HERE'S WHY

TOURNACRANES

ARE TODAY'S MOST PROFITABLE UTILITY LIFT-AND-CARRY TOOLS



Tournacranes Can Carry Capacity Loads — Besides handling lifting and spotting jobs, this one-man rig can carry what it picks up . . . One tool to handle all three of your job operations!

Tournacranes Have Telescopic Booms — Extendable boom provides lifting range from 8'9" to 31'. Boom can get close to the load, with short hoist cable to eliminate load swing and cable snarls.

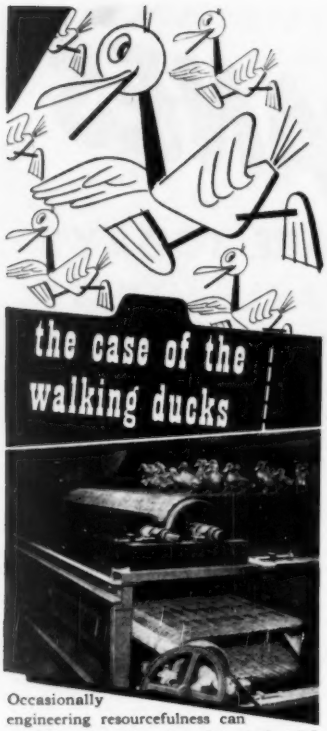
Tournacranes Are Electrically Controlled — Finger-tip switches control all steering and crane operation. Smooth, lightning-fast power comes from high-torque motors located at work centers. Motors have instant, automatic brakes to assure non-slip load control. System's extreme simplicity means any man on your crew can operate crane right now.

Tournacranes Operate in Unpaved Storage Yards — Exclusive power-proportioning differential that guarantees effective driving power, plus big, low-pressure tires add up to real off-road mobility . . . Means you spend no money for yard paving when you use a TOURNACRANE.

Tournacranes are built in a complete capacity range, so use the tool that fits your job. Write without obligation for LeTourneau Engineers' solution to your materials handling problem.

R. G. LETOURNEAU INC

LONGVIEW, TEXAS



Occasionally engineering resourcefulness can spotlight an otherwise plain industrial product with a new and unusual use . . . such as the case of this Woven Wire Conveyor Belt installation in a duck brooder.

Newly hatched ducklings, it seems, have to be kept moving to be kept alive. Placed on this specially built woven wire belt moving at a slow rate of speed, the ducklings remain there for eight days . . . continually treadmilling away from the falling end of the belt. Mortality rate dropped to zero. By-product recovery . . . duck droppings for fertilizer . . . is aided by the open mesh of the woven wire belt.

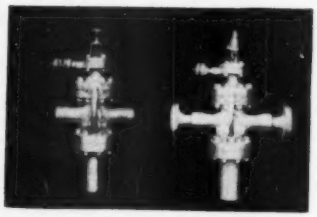
Even if you don't operate a duck hatchery, call in a Cambridge engineer whenever you have a problem concerning the movement of materials or products during processing. Let him explain the superior construction features of **CAMBRIDGE Woven Wire Conveyor Belts.**

This illustrated 130 page catalog--FREE--to men concerned with production control. WRITE TODAY.

Cambridge
WIRE CLOTH CO.
Department E • Cambridge 1, Md.
BOSTON • NEW YORK • BALTIMORE
PITTSBURGH • DETROIT • ST. LOUIS
CHICAGO • SAN FRANCISCO • HOUSTON

vises are made with forged steel jaws which hold the chain while the pin is removed. Jaws are shaped so that the pin link to be removed has a firm seating on the edges of the jaws, according to the manufacturer. Both models are adjustable to fit chains within their ranges. No. 1 will handle single-width chains from ½- to 1-in. pitch and double-width chains from D-40 to D-50. No. 2 will handle single-width chains from 1- to 2-in. pitch and double-width chains from D-80 to D-160. Baldwin-Duckworth Div., Chain Belt Co., 369 Plainfield St., Springfield 2, Mass.

•

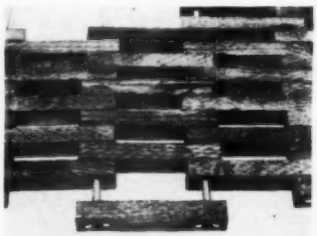


Pressure-Reducing Valve

Known as Class HS, high-pressure-reducing valve, of internal pilot piston-operated construction, is designed for steam, gas, or air service. It handles inlet steam pressures from 300 to 1500 p.s.i. and air or gas inlet pressures from 300 to 3000 p.s.i. Reduced pressure range is from 100 to 600 p.s.i. Maximum inlet temperature is 1000 deg. F. Valve has a cast chrome-moly-steel body with integral stellited seating surface. Available in 1-, 1¼-, 1½-, and 2-in. sizes with Series 90 or 150 flanges or welding ends.

Manufacturer states that no change of spring or diaphragm is needed from minimum to maximum reduced pressure setting. Valve is single seated, closing with the inlet pressure for dead-end shut off. Interchangeability of replacement parts make overhaul possible without removal of the main body from the pipe line. Leslie Co., 112 Delafield Ave., Lyndhurst, N. J.

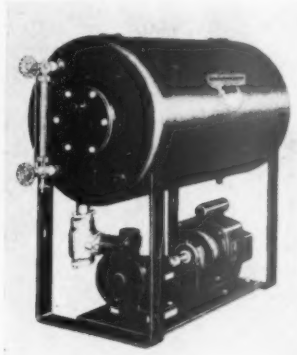
•



Wood Floor Mats

Safety floor mats, called Ra-Tox Springtred Woodlink Floor Mats, are constructed of 4½x3¾x⅝-in. processed hardwood blocks, arranged in an openwork checkboard pattern, and held together by coil spring fasteners. Fasteners, of corrosion-resistant galvanized steel, are said to have sufficient spring tension to hold the mat together firmly, yet to be flexible enough to permit expansion or contraction due to moisture absorption or drying. Mat will conform to rough or uneven floors without creating points of strain, according to its maker. Intended for use wherever oil, dirt, moisture, or fine scrap tend to accumulate and cause slipping hazards. Made in three sizes, the smallest 23¾x37 inches and the largest 30x72 inches. The Hough Shade Corp., Janesville, Wis.

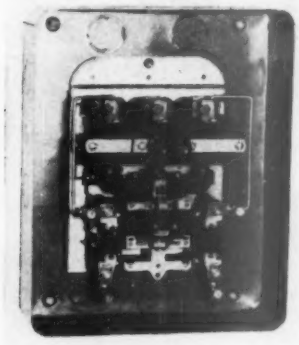
•



Boiler Return Unit

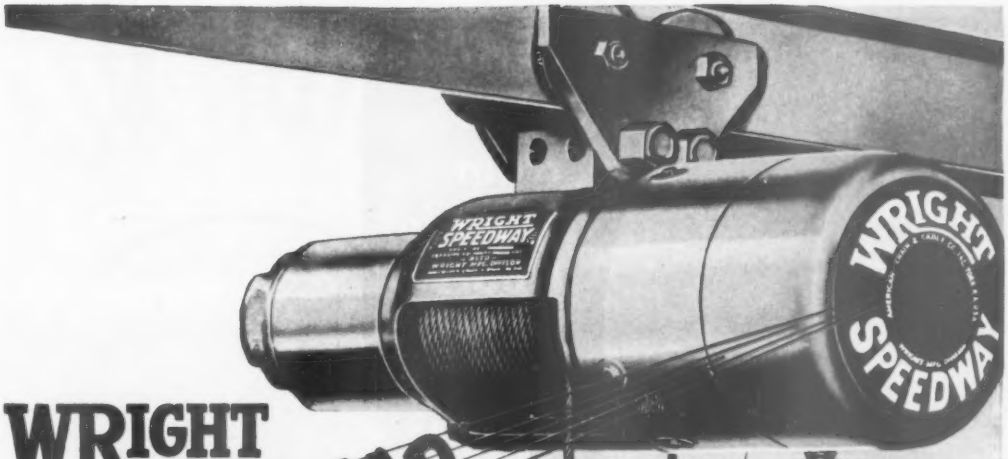
For use in plants where steam is used in process work, boiler return unit, Type XA, uses turbine-type pump to develop high pressures in single-stage construction. An automatic make-up water valve and a 20-gal. tank provide water supply to meet the demands of the boiler. Unit is available in a number of sizes for boiler horsepower from 1 to 20 and for pressures up to 1000 pounds. Roy E. Roth Co., Rock Island, Ill.

•



Magnetic Starters

Solenoid-operated magnetic starters, Bulletin 4113 Size 3 A.C., are intended for use in applications where across-the-line, non-reversing starting of poly-phase squirrel-cage induction motors and single-phase motors is permissible. Available with



WRIGHT "OVERHEAD means lower material handling

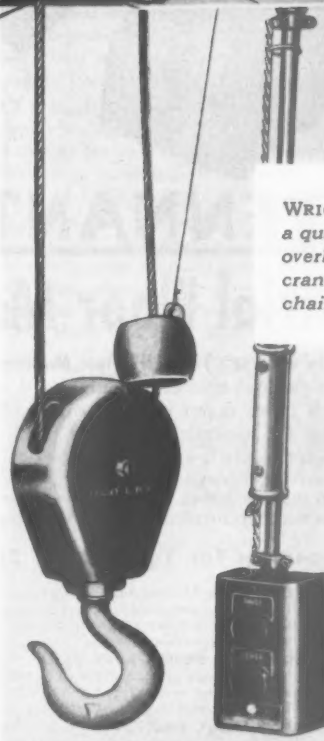
OVERHEAD

It's the new WRIGHT *Speedway* Electric Hoist. Sturdy, fast, dependable, easy-operating, long-lasting. When you get a *Speedway* you have a hoist with many extra use-advantages. Here are just a few of them:

- **Cable drum grooved to prevent damage to cable due to "piling"**
- **Swaged fittings on Tru-Lay preformed wire rope guaranteed to hold beyond 100 per cent breaking strength of the rope**
- **Motors interchangeable as to capacity or speed —or both**
- **Push button control with messenger chain to take load off cable when used as tow line with trolley mounting**
- **Gears heat-treated and hardened for longer life and smoother operation.**

. . . and many other features. From 250 to 2000 pounds capacities.

Ask your Wright distributor for further information. Or write for descriptive folder DH-1250.



WRIGHT *also offers a quality line of overhead traveling cranes and chain hoists*

ACCO

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

WRIGHT HOISTS

TRADE MARK

In Business for Your Safety

*Tennant Floor Machines are available in various sizes for 8", 12" and 16" drum accessories. Motors up to 5 h.p. (elec.) or 6 h.p. (gasoline).

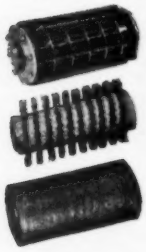
TENNANT

Industrial Floor Machine

When a powerful 6-horse* TENNANT Floor Machine bites into *any* kind of traffic-packed grime, it's pulverized and whisked up usually 6 to 8 times faster than by other methods such as hand scraping, air hammers or chemicals.

This performance makes it easy for ONE man to give you clean, smooth, fast-trucking floors in any department, regardless of type of grime. And the job leaves floors *dry* and can be done during working hours without interfering with plant operations.

Drum Accessories for Your Plant's Special Needs



REVO-TOOL—Unbeatable for high speed cleaning and leveling of heavy-industry floors, removing dried paint, cement splashes and similar grime. Ideal, too, for resurfacing. For steel mills, roundhouses, etc.

STEEL WIRE BRUSH—Revolves at 1725 RPM and shears grease, rubbery grime and metal cuttings from floors; leaves smooth, clean surface. For most factories and mills with wood block and concrete floors.

STEEL WOOL ROLL—The ideal drum accessory for fast dry-cleaning of stripwood floors in textile mills, precision instrument plants, tube factories, etc. ELIMINATES SCRUBBING; helps keep floor bright, smooth, wear-resistant.

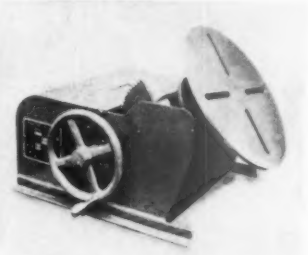
WRITE FOR ILLUSTRATED BULLETIN 81. Contains on-the-job photos, typical benefits, descriptions of machines and other valuable information.

G. H. TENNANT CO.
2554 N. 2nd St., Minneapolis 11, Minn.

The way to finer floors
TENNANT
Floor Maintenance System

open-type construction for built-in or specialized controls, or with NEMA Type I general-purpose enclosures. Starters can be controlled by separate pilot devices or can be supplied with local control push-buttons or selector switches. They have a maximum enclosed rating of 50 horsepower, 440-550 volts, 3 phase, 60 cycles. Features are said to include high arc interruption capacity, compact unit construction, thermal overload protection, built-in solderless connectors, and double break silver-to-silver main contacts. Ward Leonard Electric Co., Mt. Vernon, N. Y.

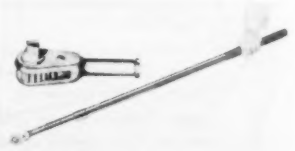
•



Work Positioner

Motor-operated work positioner, Model I-P, is driven by a hydraulic variable-speed transmission and a ½-hp. single-phase a.c. motor and has a load capacity of 100 pounds. Manufacturer states that when it is used to position welding jobs, all welds may be made in the down-hand position. Also suitable for hard-surfacing, assembling, repairing, grinding, and similar operations. Table top rotates 360 degrees at variable speeds, adjustable from 0 to 5 r.p.m. in either direction. It is manually tilted through 135 degrees and locks at any degree of tilt by means of a worm-and-segment. Ransome Machinery Co., Subsidiary of Worthington Pump & Machinery Co., Dunellen, N. J.

•



Torque Bar

Heavy-duty torque bar, called the Livermont Torq-Bar, is preset for specific torque requirements within a range of from 200 to 600 foot-pounds. In operation, a click is heard when the desired torque is reached. Simultaneously, a small button in the handle taps the operator's hand. The combination of sound and touch signals is said to eliminate the necessity for visual attention. Bar is available with or without detachable head, or with special heads built to specifications. The standard head is a reversible ¾-in. square-drive ratchet type which

AIR HOISTS

PAY THEIR OWN WAY

Every time a man picks up material, moves it, and puts it down, it adds to your production costs, yet adds exactly nothing to the value of your product. With today's cost of labor, it's only common sense to make sure your lifting and moving operations consume as little time and effort as possible.

For rapid and easily controlled lifting and moving, use job-proven Ingersoll-Rand Air Hoists; they cut production costs and now pay for themselves nearly twice as fast under today's conditions.

I-R Hoists are designed to operate with an absolute minimum of maintenance. Many I-R Hoists have been in service for years with no attention except routine lubrication; reliability is inherent in their design.

Available in capacities from 200 to 20,000 lbs., these hoists give complete and accurate speed control—from full speed to a smooth crawl—and the sturdy air motors can't be harmed by overloading or use in hot and gaseous atmospheres. Call your Ingersoll-Rand branch office for complete information, or write for Form 5020, "Hoist and Haul With Air."

AIR POWER
The Key to Lower Production Costs

IR *Products*

AIR TOOLS
•
COMPRESSORS
•
ROCK DRILLS
•
TURBO BLOWERS
•
CONDENSERS
•
CENTRIFUGAL PUMPS
•
OIL & GAS ENGINES

31r-4

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

Extend...

...PLANT PRODUCTION EFFICIENCY STANDARDS

Outside

Yard space surrounding many otherwise efficient manufacturing plants of larger size is too often neglected.

Because it is located "out back" near the tracks and far from the front gate, lower standards of material handling efficiency often "get by".

OUTSTANDING FEATURES NEVER BEFORE COMBINED INTO ONE COMPACT YARD CRANE...

GREATER MOBILITY because of short wheelbase, sharp turning specially engineered chassis.

ONE MAN OPERATION for both travelling and operating. (Undivided control).

EXTREME FLEXIBILTY.

NEW EFFICIENT AIR CLUTCHES, not to be confused with mechanical clutches set by air.

IT is now expedient to extend production line efficiency standards outdoors into open yard receiving, storage and shipping areas!

If your yard problem includes lifting, carrying and carefully setting heavy loads . . . handling or rehandling bulk materials . . . loading or unloading trucks or RR cars... feeding the production line with raw parts...excavating or trenching...carrying heavy loads from outside to inside or vice versa... or a thousand other yard operations, then you should give this illustrated and carefully descriptive brochure to key men involved. See it first *yourself!* It will suggest ways to support production line efficiency standards with equally efficient yard operations.

Just ask for the complete "Byers Traveler Crane Catalog" today.

ALL FEATURES DESCRIBED AND ILLUSTRATED IN THE NEW "TRAVELER CRANE CATALOG".

READILY ADAPTABLE TO

HOOK
SLING
GRAPPLE
CLAM-SHELL
SHOVEL
TRENCH-DIGGER

THE **BYERS** MACHINE COMPANY
101 SYCAMORE STREET • RAVENNA, OHIO
Distributors in all Principal Cities

operates in either direction. Bar is 46 inches long, weighs 5 pounds 11 ounces, and is chrome plated with rubber-cushioned handle wrapped with plastic tape. Adjustment device in the handle provides for varying torque settings. Also available in ranges up to 5000 foot-pounds. Richmont, Inc., 2810 East 11th St., Los Angeles 23.

•

Drag Clamp

Intended for use in conveying cumbersome sheets, plates, and flat stock, drag clamp is constructed with a 1-piece jaw frame mounted on a heavy shoe or base which acts as a skid. When load is placed between its jaws, clamp automatically grips it, according to manufacturer. Load may then be dragged to desired location by any power unit. Merrill Brothers, Arnold Ave., Maspeth, N.Y.

•

Coolant Cooler

Model 50-A.C., 5-g.p.m. coolant cooler for grinding, honing, and machining operations is designed to maintain coolant temperature at a maximum of 20 degrees below room temperature at rated capacity. The device is self-contained, and is wired and ready for connection to all types of machine tools, according to the manufacturer, who states that no water connections are necessary. Features are said to include the use of straight passages for flow of coolant through the cooler, high thermal efficiency, and ability to handle all conventional coolants. Hermetically sealed thermostat, adjustable to maintain any temperature between 20 degrees below and 10 above room temperature, is provided with integral control. Operation is by means of a ½-hp. motor integral with the hermetically sealed compressor unit. The evaporator, using Freon F12, is of single copper tube coil type with spiral counter-flow. Frostrode Products, 2373 East Eight Mile Rd., Hazel Park, Mich.

•

Tractor-Seat Back Rest

Canvas back rest, for attachment to tractor seats, measures 14 inches high

"Certified" Service

AN ADDED REASON FOR INVESTING IN ALLIS-CHALMERS MOTORS!

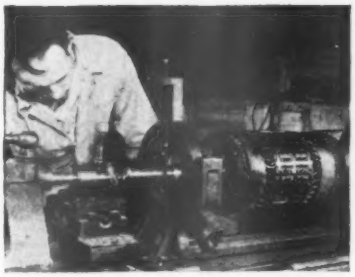
IT MEANS: 1) *Better, Faster Service.* Independent local repair shops are now being selected and authorized to service and repair Allis-Chalmers Motors, Transformers, Controls, Pumps — and "Certify" them as to workmanship.

2) *Finest Parts and Workmanship.* Shops use genuine Allis-Chalmers repair parts — or parts of equal quality; and are given complete service information, including factory procedure and drawings where necessary.

3) *Friendly Service.* Every Allis-Chalmers "Certified" Service Shop has been selected on the basis of its reputation in its community. It's the kind of company you *like* to do business with!

How can you get this service? For the present most "Certified" Service Shops are located in the larger U. S. industrial areas . . . but they're expanding rapidly. Call your nearby A-C District Office or Authorized Dealer for closest recommended shop. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

FINER, FASTER, FRIENDLIER SERVICE FOR INDUSTRY!



The A-C Supply Company of Cuyahoga Falls, Authorized Allis-Chalmers Dealer and newly-appointed "Certified" Service Shop, is staffed and equipped to give prompt, efficient, top-quality repair and service aid to customers in the greater Akron industrial area. Typical of the kind of "Certified" Service organizations being selected throughout U.S.

MANY SIZES, RATINGS OF ALLIS-CHALMERS STANDARD SQUIRREL-CAGE MOTORS ARE NOW AVAILABLE FROM STOCK. CHECK YOUR AUTHORIZED A-C DEALER, OR DISTRICT OFFICE FOR DETAILS.

A 2506

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

This Unit Heater coil is eleven feet long!

An eleven-foot assembly of copper tubes and aluminum fins, about to be made into a compact circular coil, the picture shows "Part One" of a modern Trane Projection Unit Heater.

It's the core of a great idea for salvaging ceiling heat by making warm air flow *down*. The idea was developed by Trane engineers eleven years ago, and today's Model P Projection Unit Heater is proof they took your problems seriously.

Mounted high, the light weight Model P clears craneways and other obstacles, yet its efficient propeller fan provides the velocity necessary to send heat to the floorline.

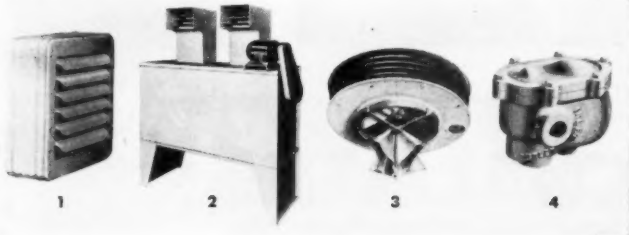
Mounted low, it requires little headroom. Its vertical flow diffuses heat thoroughly, despite machinery, partitions and lockers—particularly when equipped with the new, adjustable Cloverleaf Diffuser.

Here at Trane, where all types of unit heaters roll off the production lines daily, there is no argument about propeller vs. blower, or vertical vs. horizontal discharge. There is a place for each type. We recommend each type for its place.

THE TRANE COMPANY... LA CROSSE, WIS.

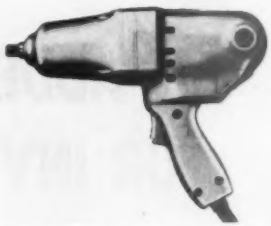
Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment — Unit Heaters, Convector-radiators, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties. IN CANADA, TRANE COMPANY OF CANADA, LTD., TORONTO.

There are (1) 24 sizes of horizontal discharge units; (2) 68 standard arrangements of blower units; (3) 16 sizes of vertical projection units—shown here equipped with adjustable Cloverleaf Diffuser. A complete line of heating specialties matches this all-inclusive unit heater line. Shown here (4), Trane heavy duty float trap.



and 23 wide. Manufacturer states that it is so designed that no metal or wood comes into contact with the operator. The 5-in. steel upright arms which support the canvas are said to provide spring action to make for smooth riding over uneven surfaces. Serrated couplings permit the unit to be raised, lowered, brought forward or back, or tilted. Mounting bar is designed to fit any tractor. Badger Precision Products Co., 1324 North 8th St., Milwaukee 5.

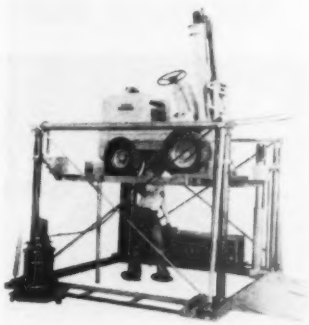
•



Impact Wrench

Portable electric ¾-in. impact wrench will tighten or remove either left- or right-handed nuts, bolts, and capscrews, states its maker, who explains that it spins a free-running nut or bolt to a seating position with high speed, direct drive action, then drives the nut or bolt to maximum tightness with rapid rotary hammering action. In removing a fastener, the hammering action loosens the nut or bolt, and the direct drive spins it free. Wrench is made of aluminum castings and has a universal motor, a side handle with automatic-release switch, reversing switch, and a three-conductor cable and plug. Available with six hexagon sockets ranging from 9/16 to 15/16 inch. The Black & Decker Co., Towson 4, Md.

•

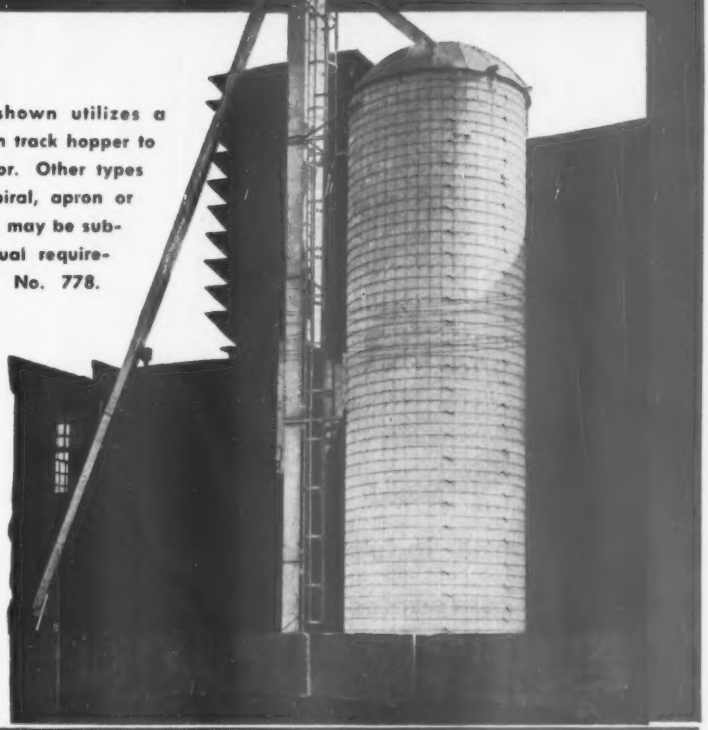


Hydraulic Lifter

Electric hydraulic lifter, for servicing fork lift trucks, trailers, and platform trucks, is built in 6000- and 12,000-lb. capacities. It is constructed with an open platform which elevates trucks to the necessary height for lubrication, inspection, and serv-

LARGE CAPACITIES MINIMUM SPACE

Arrangement shown utilizes a plate feeder from track hopper to the bucket elevator. Other types of feeders . . . spiral, apron or electric vibrating . . . may be substituted to fit individual requirements . . . Catalog No. 778.



SILO STORAGE SYSTEMS

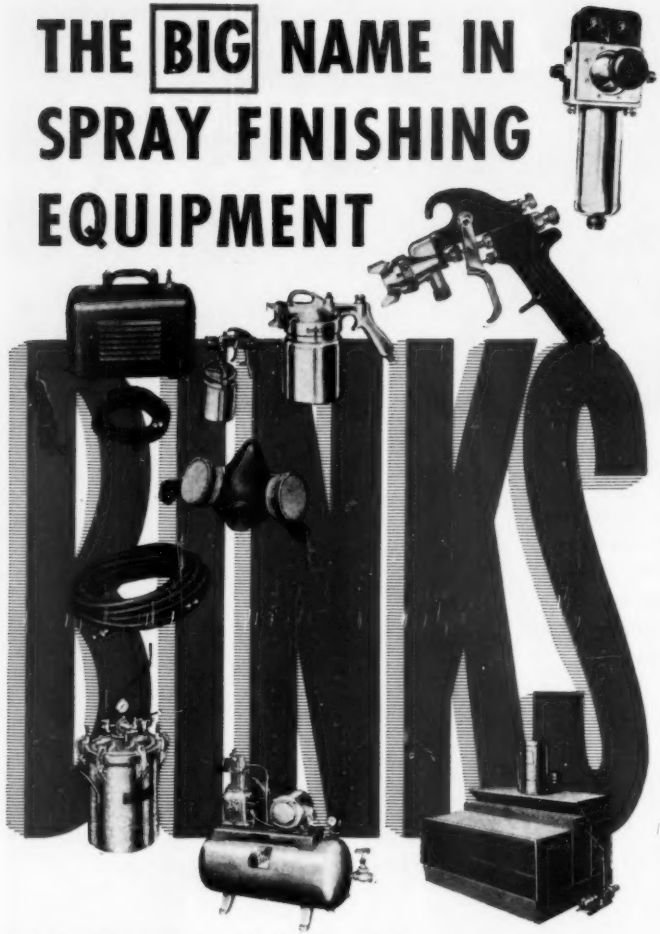
THE JEFFREY MANUFACTURING COMPANY

911 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

THE BIG NAME IN SPRAY FINISHING EQUIPMENT



BIG and small industries specify it

BIG name companies standardize on it

BIG savings are effected with it

BIG production is simplified with it

BIG service is part of it

"...We must think BIG and plan BIG if we are to retain our leadership. It's the only way." J. J. Roche President.

Binks MANUFACTURING COMPANY

3114-34 Carroll Avenue, Chicago 12, Illinois

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

If you don't have a current Binks Catalog and Price List, send for one today. BINKS

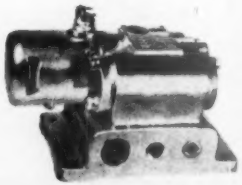
icing. A support block is provided on which truck counterweights may rest. Safety features include hooks which lock into the legs at any point during the platform rise, dead-man control, and safety-pipes which drop from the platform to the floor once the required height is attained. Service Caster & Truck Corp., Albion, Mich.

•

Thermal Watt Demand Meter

Single-phase combination watthour and thermal watt demand meter, designated as Type IHM-1, is housed in a slightly larger case than that required by a conventional watthour meter. It can be installed wherever rate structures require the determination of demand as well as energy, without increasing the size of the original installation, according to the manufacturer. The damping system and electromagnet of the recently introduced I-50 watthour meter, adapted to the new design, comprise the watthour unit. The thermal unit of the G. E. Type HI-1 thermal meter, with its direct heat operating principle, has been adapted for use as the thermal demand unit. Meter and Instrument Divs., General Electric Co., Schenectady 5, N. Y.

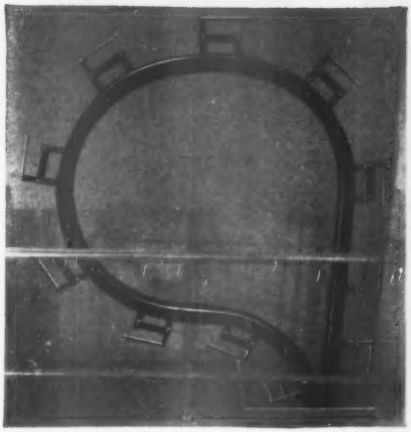
•



Automatic Air Valves

Line of solenoid-operated "Ring-Seal" air valves uses a single interchangeable and replaceable valve assembly in all valves up to ¾ of an inch and larger, three- or four-way, and with three, four, or five ports. Design is said to provide operating speeds up to 600 strokes per minute, and quick filling and dumping of cylinders. One valve assembly is used in three- and two are used in four-way valves. Valves are direct-acting and need no pilot valve. The lightweight aluminum bodies have

Curves that count



Lighten Materials Handling Loads with Richards-Wilcox ZIG-ZAG *Continuous Power Conveyor*

Designed for carrying light loads within a confined space, Richards-Wilcox ZIG-ZAG OveR-Way continuous power conveyors are serving production and processing lines in every imaginable industry—increasing efficiency, cutting costs. If you have perplexing handling problems to solve, call or write the nearest office of Richards-Wilcox . . . world's largest makers of power conveyors and door hardware . . . for free literature.

OveR-Way Conveyors Unburden Industry

3 Styles Solve Any Overhead Handling Problem

1

Richards-Wilcox Tru-Tred and Steel Beam OveR-Way for heavy loads up to 8,000 pounds.

2

Richards-Wilcox Tubular Trolley Track OveR-Way for medium loads up to 3,000 pounds.

3

Richards-Wilcox Zig-Zag Powered Chain OveR-Way for light loads to be conveyed through degreasing, finishing, baking and other processes facilitated by meandering conveyor track with power operated enclosed chain.

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

AURORA, ILLINOIS, U.S.A.

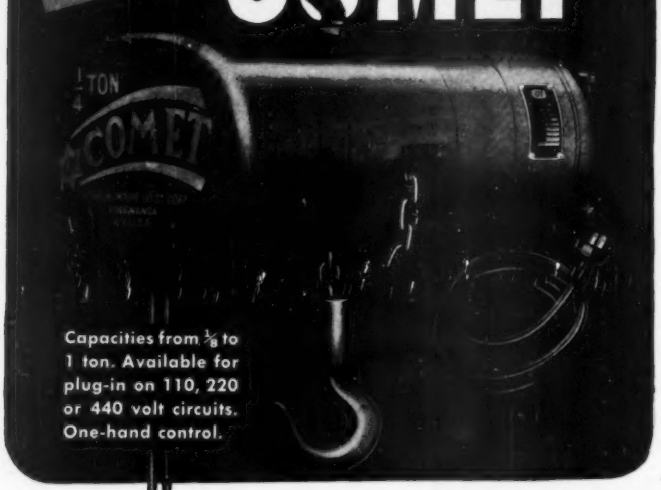
Branches: New York Chicago Boston Philadelphia Cleveland Cincinnati Washington, D.C. Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Los Angeles San Francisco Denver Seattle Detroit Atlanta Pittsburgh

1880 RICHARDS WILCOX R W AURORA 1949

OVER 69 YEARS

Electric Hoist-Power COSTS LESS

CM COMET



Capacities from ⅛ to 1 ton. Available for plug-in on 110, 220 or 440 volt circuits. One-hand control.

- ECONOMICAL
- PORTABLE
- SPEEDY
- STURDY

Manual handling of materials is inefficient . . . more so today than ever before. The CM Comet makes substantial savings in materials handling costs . . . is doing it every day in thousands of plants. Possibly the CM Comet can save a good many dollars for you too. Check up on the materials handling situation in your plant. CM Bulletin 138 . . . available for the asking . . . will bring you complete details about the Comet.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

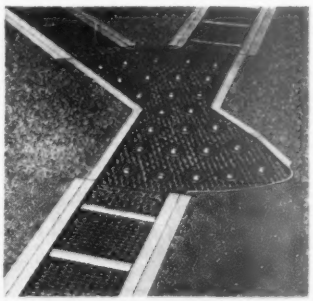
port openings in the bottom as well as the sides. Viking Products Co., Inc., 2373 East Eight Mile Rd., Hazel Park, Mich.

•

A.C. Welders

Line of a.c. welders with ratings from 100 to 2,000 amp. features heavy-duty construction. Four utility models are rated at 100, 150, and 200 amp. at 30 volts, 50 per cent duty cycle. Model 180, of limited-input type, has 180-amp. rating, 25 volts, 20 per cent duty cycle. Industrial welder line includes four models for manual welding, rated at 200, 300, 400, and 500 amp. at 40 volts, 60 per cent duty cycle; 750- and 1000-amp. single-transformer models for automatic-head welding, and 1000-, 1500-, and 2000-amp. multiple-transformer models for combination manual-automatic use. Power factor correction is standard on all industrial models and on Model 180, optional on other utility models. All models are equipped for dual-range output. Industrial manual welders generate 40 volts open circuit, with 80-volt push to provide a high rate of deposit, according to manufacturer. Glenn-Roberts Co., Inc., 2107 Adams St., Indianapolis 18.

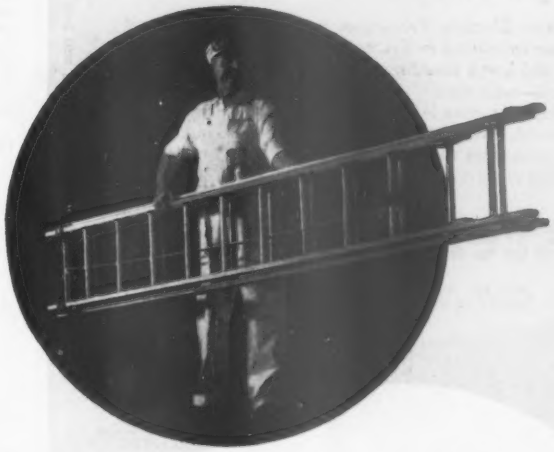
•



Floor Trackage Conveyors

For handling paper rolls or other heavy material, floor trackage conveyors may be installed to cross an entire room with a turntable situated at a convenient point to turn the rolls from main track to side tracks, leading to the machines. A 4-way turntable moves loads from

A REVEALING NEW BOOK—Here's the inside story on how manufacturers of a wide range of products have found that it pays to use magnesium. It's a book of actual case studies of successful magnesium applications—a book that will be of direct interest to you.



How Magnesium Pays

IN MANUALLY HANDLED EQUIPMENT

PROBLEM:
Reducing weight meant reducing handling costs of this ladder. That's why the manufacturer considered substituting another material for wood. He found wood unnecessarily heavy, and subject to warping, rotting and splintering.

SOLUTION: Magnesium extrusions are welded, riveted or bolted together to make a variety of sizes—ranging from stepladders to 24′, 32′ and 36′ extension ladders. Magnesium first provides lightness. The 24′ extension ladder in wood weighs 63 pounds—in magnesium only 28 pounds. Second, by eliminating rotting, warping and splintering, greater durability has been achieved in the magnesium type. Since the properties of magnesium are more uniform than those of wood, more efficiently designed sections can be used.

YOU, TOO CAN MAKE MAGNESIUM PAY!

Magnesium pays for others—it can pay for you. Get the facts—send for this new study today.

MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Send me the study MP 49-12 "How Magnesium Pays," without obligation.

_____

_____

_____

_____

MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis
Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

This Crescent

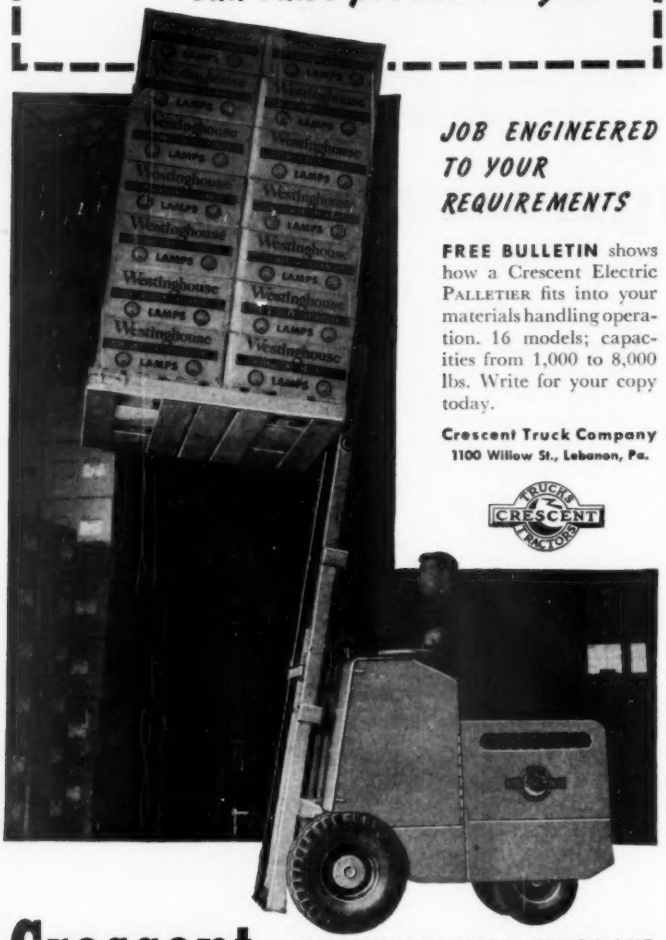
raises profits for Westinghouse

The Crescent Electric PALLETIER does just that in this Westinghouse warehouse in Trenton, N.J. It lifts, hauls, stacks loads high and keeps handling costs low. One operator does the entire job—with ease.

Wherever the PALLETIER is in use, costs decline. Maneuverable and packed with power, the PALLETIER slips in and out of narrow areas, negotiates ramps, cuts terminal time for loading and unloading of carriers.

A Crescent

can raise profits for you



JOB ENGINEERED TO YOUR REQUIREMENTS

FREE BULLETIN shows how a Crescent Electric PALLETIER fits into your materials handling operation. 16 models; capacities from 1,000 to 8,000 lbs. Write for your copy today.

Crescent Truck Company
1100 Willow St., Lebanon, Pa.

TRUCKS TRACTORS CRESCENT

Crescent ELECTRIC INDUSTRIAL TRUCK AND TRACTOR SPECIALISTS SINCE 1917

one track to another, while another track is being used.

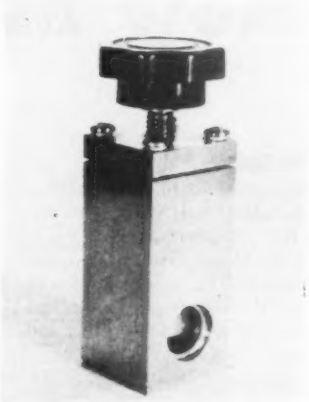
Angular fan-tail device, another way to turn a load, is stationary, but the load is turned on movable balls rather than on rollers. This unit makes it possible to turn the load and convey it in any direction, depending on the number of tracks leading from it. Fan-tail units, track, and turntables require a maximum of 4 inches in depth. Engineering Products Co., 122 South Michigan Ave., Chicago 3.

•

Insecticide

Containing a recently developed insecticide, Chlordane, as well as the "drive-out" and paralyzing agents, pyrethrin and organic thiocynate, compound exerts a 3-way action. Manufacturer claims that if substance, called Gulfspray Roach and Ant Killer, is thoroughly applied and not washed or worn off, the liquid kills insects coming in contact with sprayed surfaces for as long as six months after application. Since it is not repellent, it is claimed that insects do not hesitate to crawl on the invisible film after the pyrethrin vapors drive them from their hiding places. Gulf Oil Corp., 3802 Gulf Bldg., Pittsburgh.

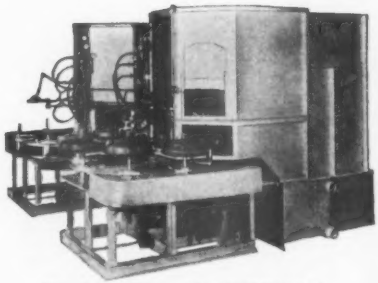
•



Packless Valve for Vacuum Systems

Vacuum-tight Type R 90-deg. packless valves of the bellows type are designed for minimum flow resistance. The ¾-in. unit measures $1\frac{1}{8}$x $1\frac{1}{8}$x$3\frac{1}{8}$ inches, and has provision for solder connections. Pipe thread connections are also available in sizes up to 3 inches. Valves are machined from square brass stock to allow mounting on any of the six flat faces by drilling and tapping holes. Low resistance is said to be achieved by a large lift of the valve disk; a multiple thread on the stem is said to reduce the number of turns required for full opening. Bellows-and-disk assembly is removable for maintenance by taking out four small screws, without removing valve body from the line. Suitable for use in all types of vacuum sys-

Putting Air to Work!



Here is a typical example of DeVilbiss engineering skill. This DeVilbiss automatic paints brake drums at the rate of 1,000 per hour. Possibly some phase of your finishing can be done automatically.

Here is a master craftsman—the glass-blower—putting air to work in the practice of his highly skilled profession. Glass-blowers of old were elevated to the nobility and many of their beautiful creations have come down to us through the ages as fitting testimonials to the enduring worth of work well done.

For 61 years DeVilbiss has also made an art of the business of putting air to work. As a result of this long time specialization in increasing production and lowering costs, the name DeVilbiss on a product or complete finishing system is accepted to mean just one thing . . . *nothing better for the purpose can be found anywhere.*

The unsurpassed speed and efficiency of DeVilbiss systems save valuable man-hours, cut costs, help you produce for less—sell for less. DeVilbiss is today's leading authority on "how to spray it best at lowest cost." When you want such information and the equipment that will do your job best, call DeVilbiss.

THE DEVILBISS COMPANY • Toledo 1, Ohio

Canadian Plant: WINDSOR, ONTARIO

DE VILBISS *means* **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

VACUUM
SPEEDS CHUCKING . . .
another problem solved with
GAST ROTARY PUMPS

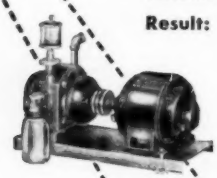
HOW TO HOLD ODD-SHAPED PIECES IN SPEED LATHE

Problem: Find a way to cut chucking time — and boost productive capacity — on a high-speed lathe used for polishing odd-shaped pieces.

Solution: A Gast Rotary Vacuum Pump (Model 20FF60) supplies vacuum for positive chucking through hollow spindle with rotary joint. Using a 1 h.p. direct-drive motor, pump rating is 17 c.f.m. — vacuum up to 27 inches.

Result: Chucking and set-up time is cut — productive time is increased. Thus, through keen engineering insight, another manufacturer improves his product with Gast Rotary Vacuum Pumps as components.

Lathe Manufacturer's name on request.

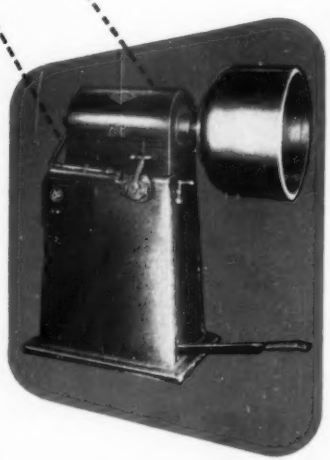


Perhaps you'll never face a problem just like this . . . yet Gast Rotary Units may solve other problems you'll have tomorrow!

Over 200 different variations of basic Gast units now serve as original equipment on scores of products. In totally *unrelated* fields — from automotive repair to chemical processing — Gast Rotary Air Motors, Vacuum Pumps and Compressors are helping improve performance, increase safety, and lower costs.

As an executive concerned with product design and improvement, you'll want to know more about Gast Rotary Units. If you have a specific problem, write us the details. We'll gladly cooperate with engineering help. Ask for your copy of our Idea-Catalog, too.

Remember —
"Air may be your Answer."



WRITE TODAY!
Request your copy of Gast's IDEA-CATALOG

GAST ROTARY
AIR MOTORS - COMPRESSORS - VACUUM PUMPS
(TO ONE H.P.) (TO 30 LBS.) (TO 28 INCHES)
GAST MANUFACTURING CORP., 137 Hinkley St., Benton Harbor, Mich.

tems, as well as in low pressure systems where tightness is important. Vacuum Electronic Engineering Co., 316 37th St., Brooklyn 33.

•

Fire Extinguisher

Fire extinguisher, called Emergency Fireman, was designed for use by inexperienced operators on flammable liquid and electric fires. Containing two pounds of "Plus-Fifty" dry chemical, it is rechargeable after use. The cap is built into the mounting bracket and comes off when the extinguisher is taken down for use, leaving the perforated top open to apply the chemical. Manufacturer claims chemical is non-toxic, a non-conductor of electricity, non-corrosive, and non-abrasive, and will not deteriorate, solidfy, or evaporate. Ansul Chemical Co., Fire Extinguisher Division, Marinette, Md.

•

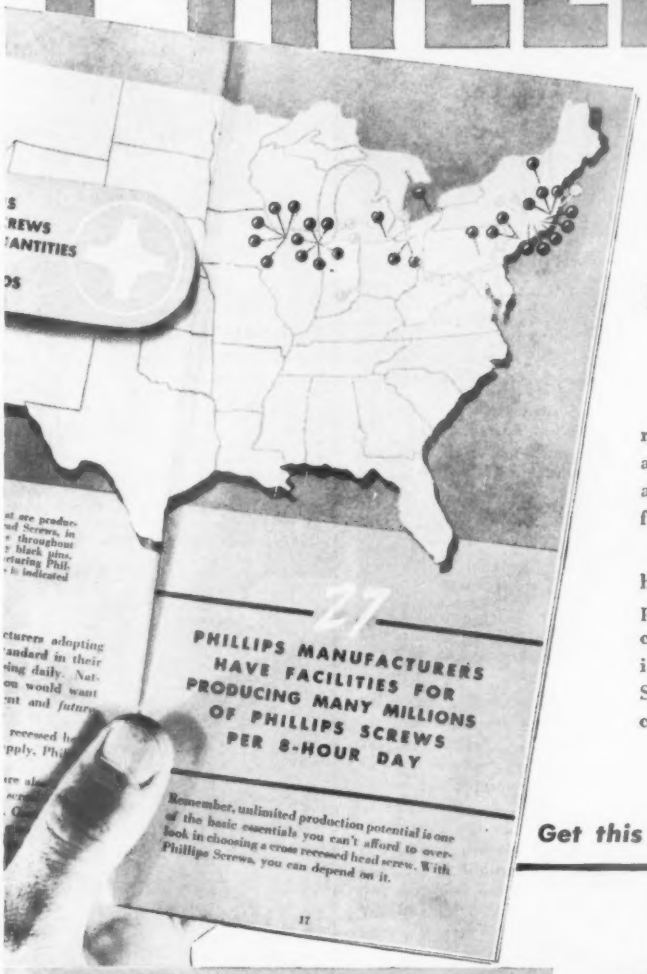
Transformer Turn Ratio Test Set

Portable direct-reading instrument for measuring turn ratio in power transformers is designed for use on all types and sizes of power, distribution, and auto-transformers in common use, according to manufacturer. Such measurements are used during installation of transformers, in analyzing transformer troubles, and identifying tap connections. The set also indicates polarity.

Set consists of a multi-ratio reference transformer which is excited by

ONLY PHILLIPS RECESSED HEAD SCREWS

are available from MULTIPLE sources of supply


27
PHILLIPS MANUFACTURERS HAVE FACILITIES FOR PRODUCING MANY MILLIONS OF PHILLIPS SCREWS PER 8-HOUR DAY
Remember, unlimited production potential is one of the basic essentials you can't afford to overlook in choosing a cross recessed head screw. With Phillips Screws, you can depend on it.
17

With the cross recessed head screw rapidly becoming the preferred screw for all types of industrial assemblies, it is all-important to be sure that present and future needs can be supplied.

Since Phillips is the only cross recessed head screw with *multiple* sources of supply, Phillips Screws are your logical choice. And this is just one of the five important reasons why *only* Phillips Screws give you *all* the advantages of the cross recess design.

Get this new Fact-Full Booklet

that lets you in on the important facts you can't afford to overlook when you choose cross recessed head screws. It's FREE. Use the coupon.

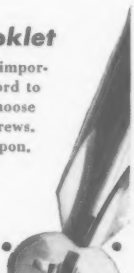
GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS . . .

GET PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

27 SOURCES

American Screw Co.
Camcar Products Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
Elco Tool & Screw Corp.
Tor. H. M. Harper Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Rockford Screw Products Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Seaboard Screw Corp.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wales-Beech Corp.
Wolverine Bolt Company



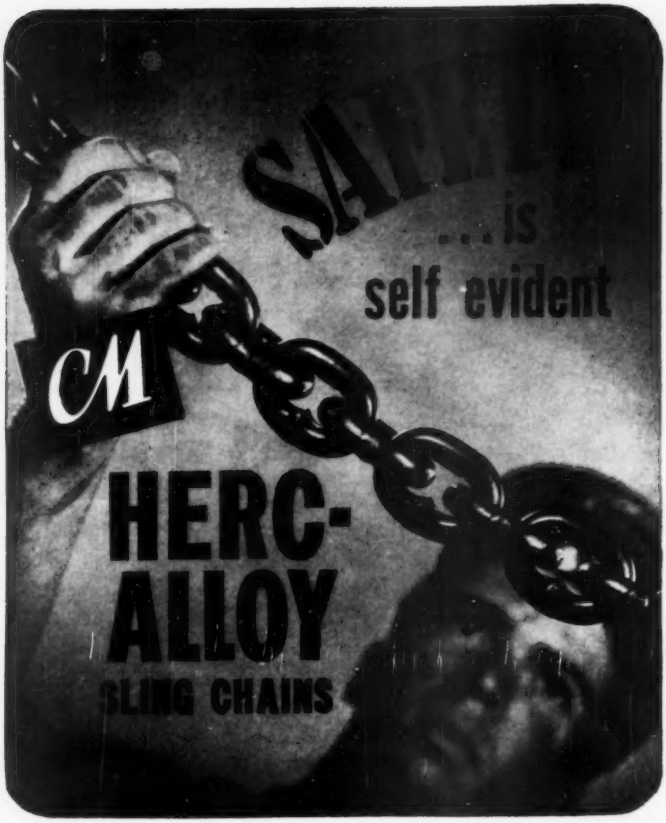
Phillips Screw Mfrs., F-37
c/o Horton-Noyes Co.
1800 Industrial Trust Bldg.
Providence, R. I.

Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

Name _____

Company _____

Address _____



HERC-ALLOY FEATURES

- America's *first* alloy steel sling chain... first to bear a serial number.
- Every CM HERC-ALLOY Sling Chain is alloy steel throughout... links, rings, hooks. There is only one grade... *the best.*
- Every chain is individually tested and accompanied by a certificate of registration.
- Links are side welded for maximum strength by patented INSWELL electric method.
- HERC-ALLOY Chains should *never* be annealed.
- HERC-ALLOY Chains are lighter... stronger... easier to handle... outlast ordinary chains 4 to 5 times... cost less on the job.

HERC-ALLOY... the chain you can *SEE* is safe

- A simple visual inspection* is all that is needed to determine the continued serviceability of a HERC-ALLOY Chain. That's why more and more of the important companies are standardizing on HERC-ALLOY... because HERC-ALLOY Chains are immune to unseen dangerous crystallization... because you can *see* when a HERC-ALLOY Chain needs repairs or replacing.

Write for your copy of this new, informative booklet. No charge.

COLUMBUS-McKINNON

CHAIN CORPORATION

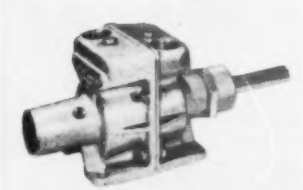
Affiliated with Chisholm-Moore Hoist Corporation

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

means of a small hand generator, in parallel with the transformer under test. Four dial switches and a null balance indicator adjust the reference transformer in ratio to equal that of the transformer under test. The ratio is then read directly from the dial switch indexes. Maker states that ratios up to 130 can be measured with an accuracy to within one part in 1000. The set is supplied with testing leads and weighs about 31 pounds. James G. Biddle Co., 1316 Arch St., Philadelphia 7.

•



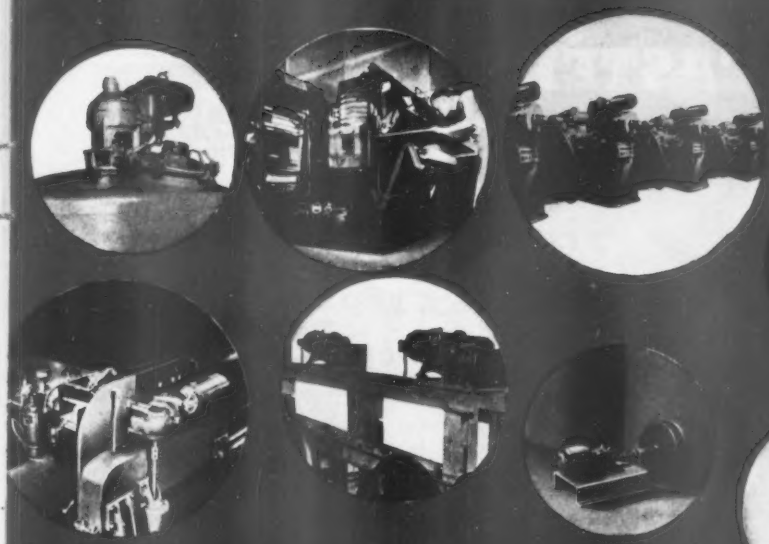
Gearless Liquid Pump

For handling liquids and viscous fluids, gearless pump features a dual eccentric piston design, said to give a strong flow against pressure. Pump body is of bronze forging or stainless steel casting and the pistons of resilient compounds. It is fitted with self-lubricating bearings. Available in four sizes, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ inches, with capacities ranging from 1 to 12 g.p.m., varying with pump speed. Pumps may be used against pressures ranging up to 100 p.s.i. Manufacturer claims that they will deliver at speeds from 200 to 2400 r.p.m., and may be used in various positions. Eco Engineering Co., 12 New York Ave., Newark 1.

•

Steam, Air Hammer

Made in a range of sizes from 50 to 500 pounds falling weight, general-purpose hammer can be used wherever steam or air lines are available. It can handle a variety of jobs, from tool dressing and general light blacksmithing to emergency forging



On thousands of applications, stepless variable speed operation assures exactly the right speed for every operation . . . for each operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a better quality product and more efficient performance of your equipment and your operators.

IT PAYS

Master Speedrangers provide this infinitely variable speed in compact, all-metal, mechanical variable speed units in a wide range of types and sizes up to 5 horsepower.

See how the Speedrangers on the applications shown incorporate an electric motor, a variable speed unit, a gear reduction, and an electric brake . . . all standard Master units that easily combine into a compact, integral power drive. This provides exactly the right speed, the right features, in a unit that you can use right where you want it.

Write for Data 7525, a new 24-page book on Speedrangers, and see what a real job they can do for you.

MASTER SPEEDRANGERS

THE MASTER ELECTRIC COMPANY · DAYTON 1, OHIO

DARNELL CASTERS

Nearly 4000 TYPES

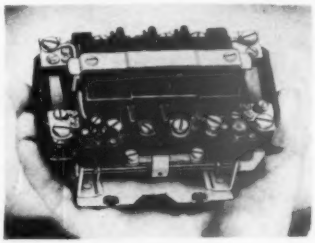
DARNELL Casters and Wheels—SAVE MONEY and eliminate that mid-afternoon "bogging down" of production.

Free
Manual

DARNELL CORP. LTD.
LONG BEACH 4, CALIFORNIA
60 WALKER ST., NEW YORK 13, N.Y.
36 N. CLINTON, CHICAGO 6, ILL.

of repair parts or maintenance work, according to the manufacturer, who states that the hammer requires no foundation, and that installation is a simple matter. Frame and anvil are cast in one piece to prevent rock or sway. Other features include an automatically lubricated cylinder, heat-treated, ground face, alloy forged steel flat dies, induction-hardened piston rings, and a self-seating rotary-type valve directly connected to the throttle control. Chambersburg Engineering Co., Chambersburg, Pa.

•



Magnetic Starters

Design of small local-control magnetic starters, in Models 1 and 0, permits an enclosure measuring 6 3/16x11/16 inches. Manufacturer states that all line, load, and control terminals are accessible from the front and are plainly marked for wiring. Line wires are connected at one end, load wires at the opposite. Hand reset is standard, automatic can be furnished when specified. The Start and Stop units are externally operated by pushbuttons. Other features include large contacts, separate contact compartments, uniform contact pressure, and resistance to shock and vibration. The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6.

•

Filter Cleaner

Self-contained automatic filter cleaner unit designed to be used with

WANT A

10-FOOT LIFT?

Get the telescopic *WORKSAVER*

TILTING FORK ELECTRIC TRUCK

Pallet loads, skid bin loads, loads with stringers attached—all can be piled high with this new 10-foot lift Worksaver. It gives you every advantage of available cubic footage in storage areas, in freight cars and motor trucks.

It's just the right truck for easy, fast and safe operation wherever clearances are low, wherever aisles are narrow. It lifts and travels by electric power. And the Telescopic Worksaver is rugged, powerful, economical to use. There's ample battery capacity for two days' operation without recharging.

So if you want to cut your production costs—if you want to put new speed into handling operations—the new Yale Telescopic Worksaver is the time, effort and money-saving electric truck for you. Get all the facts. See the classified section of your telephone book for our nearby representative or send for bulletin M-123. The Yale & Towne Manufacturing Company, Philadelphia Division, Philadelphia 15, Pa.

CAPACITIES:

2000 LBS. *up to 48" load length*

2500 LBS. *up to 36" load length*

3000 LBS. *up to 28" load length*

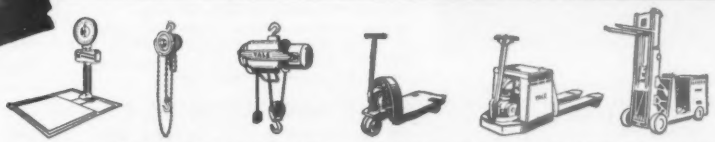
STANDARD MINIMUM HEIGHT: 83" for factory and warehouse use / 68" for freight car and motor truck loading

FREE FORK LIFT
60¾" on 83" high models
45¾" on 68" high models

Fork carriage elevates to minimum height before secondary uprights start upward. This "free fork lift" is an outstanding advantage because it permits stacking to greater heights where clearances are low and in freight cars and motor trucks. The Telescopic Worksaver is the only truck in its class that gives you this feature.

MATERIAL HANDLING MACHINERY

CUTS PRODUCTION COSTS... SAVES TIME... SAVES EFFORT... PROMOTES SAFETY



INDUSTRIAL SCALES • HOISTS—HAND AND ELECTRIC • TRUCKS—HAND LIFT AND ELECTRIC

CRESCENT

Multi-Conductor Control Cables

WITH

SYNTHOL

INSULATION AND JACKET

Each of the 7 conductors in the CRESCENT Control Cable shown here is insulated with SYNTHOL Thermoplastic and the cable assembly as a whole is protected with a SYNTHOL sheath. SYNTHOL is more stable than rubber compounds. It is highly resistant to moisture, oils and most chemicals and will not support combustion.

The individual conductors are color coded for easy identification.

CRESCENT Control Cables are widely used for remote control operation of motors, circuit breakers and other electrical power equipment, and for many types of automatic or supervisory control circuits.

C R E S C E N T

INSULATED WIRE & CABLE CO.

TRENTON, N. J.

TORIT DUST COLLECTORS

win "converts" on this converted planer

Illustrated above is a special purpose grinder. A large farm tool company built it from an old planer, and to catch the dust, resulting from its operation, they used a Torit No. 75 Dust Collector equipped with a 4 inch flexible hose. The nozzle is permanently attached to the wheel guard. It moves with the grinding wheel and operates with practically 100% efficiency.

Torit Dust Collectors can be adapted for nearly every dust collecting job. Compact and efficient, they take up little room and, by recirculating the cleaned air, minimize heat losses.

For information and catalog showing the many types and sizes of Torit Dust Collectors available for immediate delivery, write:

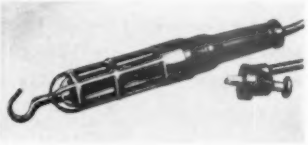
TORIT MANUFACTURING CO.

297 Walnut Street St. Paul 2, Minn.

manufacturer's Model 1150 Dustkop dust collectors is suitable for use in heavy-duty buffing operations where fine lint fails to separate out in the cyclone. The self-cleaner removes this lint, by suction, from the inner surface of the filter where it adheres, eliminating it through the cyclone.

Mechanism consists of a semi-circular spun-glass filter and a motor-driven nozzle enclosed within the assembly to reciprocate continuously over the inner surface of the filter. Nozzle is connected by a flexible fabric hose to the inlet of the dust collector, but this extra connection, according to the manufacturer, does not decrease the amount of suction available for the wheel hoods. Aget-Detroit Co., 391 Main at Washington, Ann Arbor, Mich.

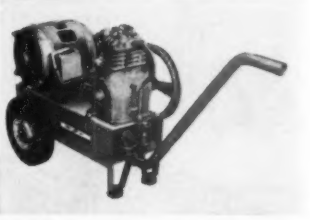
•



Extension Hand Light

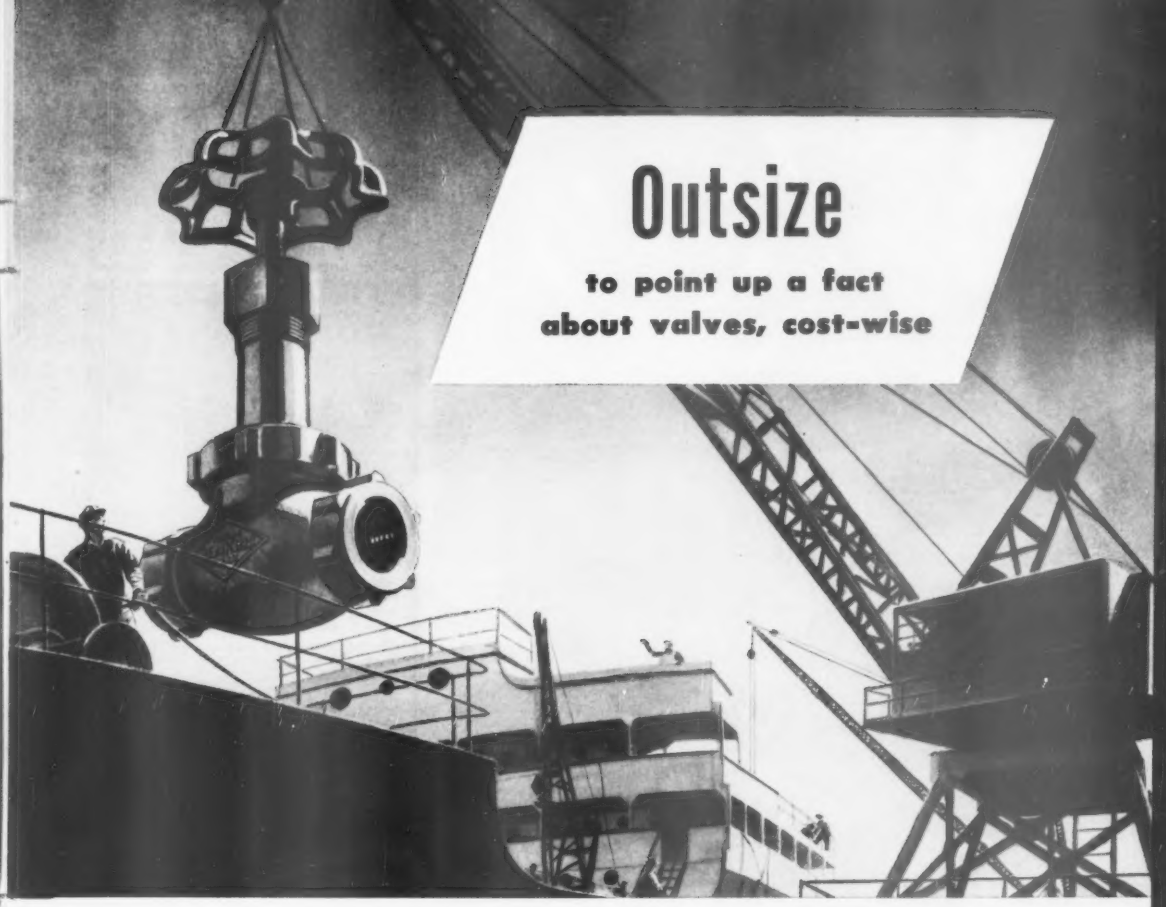
Called the Neogard, extension hand light can be used in high-voltage work or submerged in salt water, according to the manufacturer. All surface areas are of non-metallic material, making it sparkproof and eliminating the need for a ground. The lamp guard, made of high-impact, non-metallic material, glows red when lighted, acting as a safety signal. A phosphorescent guard can be furnished that will glow several hours after light is extinguished. A triple seal is said to make light waterproof and to provide for safe use under water. Its overall dimensions, $1\frac{3}{4}$x$12\frac{1}{2}$ inches, make possible use in any 2-in. opening. Light weighs $4\frac{1}{2}$ ounces. The Pyrex lamp used is said to be resistant to welding spatters and sub-zero weather. Non-metallic swivel hook holds lamp in position, and manufacturer's Neolock 105 plug, claimed to lock fast into any outlet, provides contact. Neoline, Inc., 124 West 4th St., Los Angeles 13.

•



Air Compressors

First of a line of air compressors is a portable unit intended for use with motors of either $\frac{3}{4}$ or $1\frac{1}{2}$ horsepower. Its over-all dimensions are 24x15x20 inches; it weighs 90 pounds, without motor. It is single-



Outsize

to point up a fact about valves, cost-wise

NO SHIP was ever fitted with a valve this big. We took broad liberties with proportion in this picture because a valve's size can be misleading. In comparison with larger plant units, the cost of a single valve seems a minor, "petty cash" investment. But if, as here, *all* the valves could be viewed as *one* valve, you would see that valves actually represent a *major* expenditure.

In any plant, any building where operation involves fluid control, it pays management to keep this "collective" valve in mind. These days, especially. You pay more than ever today, in wages and material costs, for every operation in your plant — including valve maintenance.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by *thousands*, it is a serious drain on operating budgets.

JENKINS BROS. helps you meet this problem. In *two* ways. One, by building extra endurance into Jenkins Valves. They are the longest-lasting, lowest-upkeep valves that money can buy. Two, with advice from Jenkins Engineers on any question of proper selection, installation, or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering for lowest valve costs in the long run. *Sold through leading Industrial Distributors.*

Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

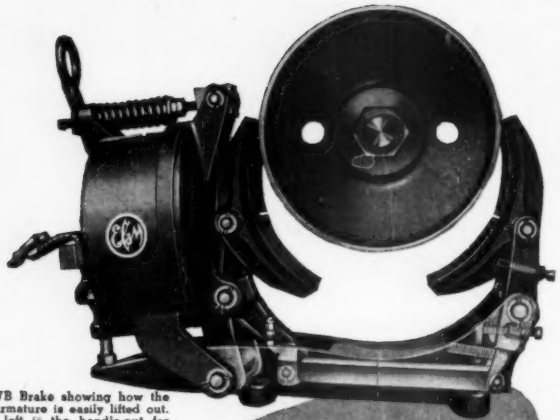
"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write JENKINS BROS., 80 White St., New York 13, N. Y.

LOOK FOR THIS DIAMOND MARK

SINCE 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need



Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.

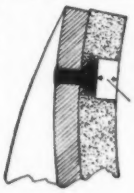
Long Life Brakes for A-C and D-C Motors by EC&M

The brake lining is molded to match curvature of wheel and shoe.

These Type WB Brakes for a.c. and d.c. service have a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

EC&M Type WB Brakes are built in several sizes. They can be supplied with series or shunt-wound operating coils for direct current motors. On alternating current service, they are supplied in shunt-wound form for use with a compact rectifier-unit. Send for Bulletins 1004 and 1006 describing these long life brakes.



Actual wearing thickness, between rivet heads and brake wheel, is 1/8" on the smallest size to 1/2" on the largest size.

EC&M

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79th STREET • CLEVELAND 4, OHIO

stage, two-cylinder, air-cooled, has a 2⅜-in. bore, a 2-in. stroke, and a working pressure of 60 p.s.i. Piston displacement is 5.5 c.f.m., with the ¾-hp. motor, and a 9.1 c.f.m. with the 1½. Standard equipment includes the compressor unit, air receiver, pressure gage, safety valve, air cock, unloader, motor, electric cord, switch at the motor, 2x6-in. ball-bearing wheels with solid cushion rubber tires, and a detachable handle for shipping, storage, or working in confined areas. The Black Mfg. Co., Baltimore, Md.

•

Battery Cell Tester

High-discharge cell tester, No. 610A, has a one-way reading meter, and may be used without removing the battery. Pointed prongs, ¾ inch apart, when placed on the terminal of the cell, register current on the meter, which, instead of indicating voltage readings, is divided into three different-colored sections marked *dead*, *weak*, and *okay*. The device is 12 inches long, 4 inches wide, weighs 17 ounces. The Sterling Mfg. Co., 9205 Detroit Ave., Cleveland 2.

•

Portable Pressure Sprayer

Designed for use in spraying insecticides, oil sprays, disinfectants, weed killers, fumigants, rodenticides, whitewash, cold water paints, and other liquids, portable pressure sprayer has a 10-oz. CO_2 gas cylinder mounted on the outside of a 3-gal. galvanized tank. This separate pressure chamber, which holds

Best Wishes for better filing in 1949

STAINLESS STEEL FILE. Special-shape teeth to withstand high abrasive action of the tough chromium carbides and nickel alloy. Same types and sizes as regular-purpose files.

BRASS FILE. Short-angle "upcut" teeth prevent file running off work and keep file clear. Long-angle "overcut" breaks up filings. Flat and Half Round shapes, 8" to 12".

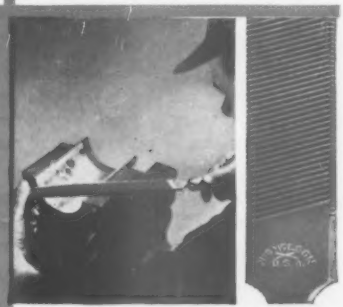
FOUNDRY FILE. Has extra-rugged teeth to resist breaking out. For fast metal removal on castings. Available in Flat and Half Round shapes, 8" to 14".

ALUMINUM "A" FILE. Special serrated-tooth and "open-throat" cut – to prevent clogging. For filing aluminum and other ductile metals. Flat and Half Round, 6" to 14".

IT ISN'T the cost of the file but the cost of the workman's time that counts in files and filing operations. Selecting *The right file for the job* is very important. Not only does it save time but it increases efficiency and reduces rejects.

Make your industrial distributor a helpful consultant on files as well as your supplier. *And be sure to send for "FILE FILOSOPHY"—48 intensely interesting pages on files. Every shop foreman needs a copy.*

NICHOLSON FILE COMPANY
27 Acorn St.
Providence 1, R. I.
(In Canada, Port Hope, Ont.)



LEAD FLOAT. Has coarse, short-angle teeth – a series of stubby "blades" which shear or "float" away metal. For lead, babbitt, pure copper. Flat and Half Round shapes.

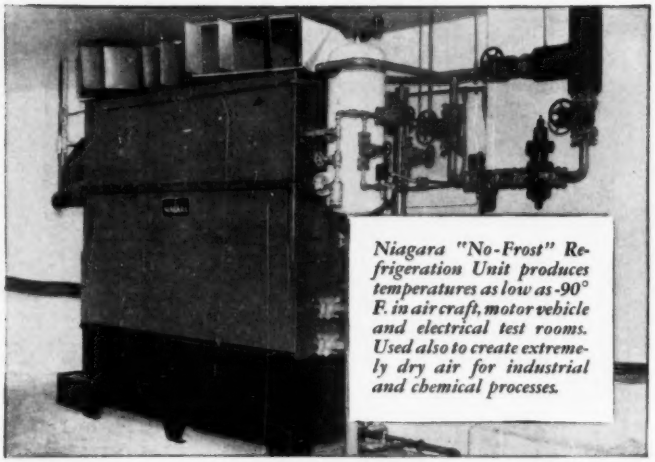
SUPER-SHEAR FILE. An exclusive milled curved-tooth file with teeth in off-center arcs, for roughing and smoothing in one operation. Serrations break up filings. 8" to 14" lengths.

LONG ANGLE LATHE FILE. Teeth cut for clean-shearing—for fast, smooth finishing under light pressure. Made single cut on flat blanks in 6" to 14" lengths.

MILLED CURVED TOOTH FILE. Matchless in workmanship. Proper tooth face and rounded gullets minimize clogging. Shoulders lower than tooth tops permit use as surfacing tool.

NICHOLSON FILES *FOR EVERY PURPOSE*

INCREASED PRODUCTION AND A MORE UNIFORM PRODUCT WITH A *Controlled Atmosphere*



Niagara "No-Frost" Refrigeration Unit produces temperatures as low as -90° F. in aircraft, motor vehicle and electrical test rooms. Used also to create extremely dry air for industrial and chemical processes.

● A controlled atmosphere may be a particular gas, inert or reactive, or it may be air under controlled conditions of purity, temperature or moisture content. Its purpose is to further production or prevent loss of material or product, or to make a uniform and better product.

This Company has worked for many years among such problems and has developed special apparatus that has helped many industrial leaders to improve their manufacturing.

Always, there is a problem of moisture and temperature, whether it may be a special gas atmosphere for heat treating, or air under most precise specifications for a process with hygroscopic materials, or a "cold test" room at -90° F.

Niagara Units for industrial air and gas conditioning make it easier for you to find equipment that will produce the conditions you need with both installation and operating economy.

Write for a Niagara Blower Bulletin on a subject which interests you, or for the address of the nearest Niagara Field Engineer.

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. F 405 Lexington Ave., New York 17, N. Y.

District Engineers in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

enough CO_2 for spraying 15 gallons or five complete tankfuls of spraying liquid, permits the tank to be filled to capacity, according to manufacturer, who states that the CO_2 stored-up energy, when released into the air-tight tank, results in immediate, continuous, and uniform spraying without the necessity for hand pumping. A valve on the CO_2 cylinder maintains controlled pressure on the spraying compound. Suitable for use with rust-resisting, cement curing, water curing, binding, and other compounds, it may also be used as a fire extinguisher.

Cylinder is detachable for refilling or replacement. Sprayer features wide turret-type top to facilitate filling and cleaning, air-tight pump and tank cover, 36-in. oil-and-chemical-proof hose, and 24-in. brass extension and nozzle with extra spray jet. Wide knapsack-type carrying strap is adjustable. Also available with a 4-gal. tank mounted on the lightweight two-wheel cart in Model 120-8. R. E. Chapin Mfg. Works, Inc., Batavia, N. Y. ●

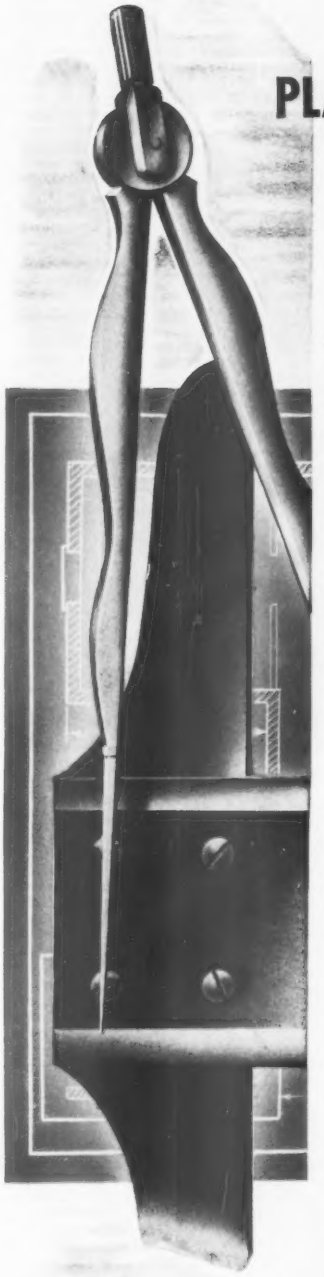
Heavy-Duty Impact Tool

Known as the 8U, electric impact tool is suitable for heavy jobs such as removing covers from machines, tightening or loosening nuts on large pipe collars, and other general maintenance work. With standard accessories, according to manufacturer, it is rated to run and remove nuts up to $\frac{5}{8}$-in. thread size; drive and remove studs; extract broken capscrews and studs; apply and remove machine screws; run wire brushes; drill bricks, metal, and masonry; tap; and ream. It may also be used for wood boring. It is $12\frac{1}{8}$ inches long, weighs 9 pounds, 13 ounces, is available for either 110- or 220-volt current, and operates on either a.c. or d.c. Ingersoll-Rand Co., 11 Broadway, New York.

●

Temperature Recorder

Indicating and recording instrument called Speedomax automatically logs as many as 160 separate thermocouple temperatures in succession at

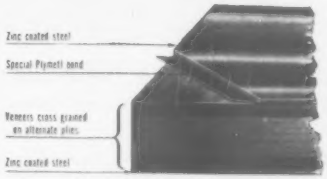


PLAN WITH Plymetl

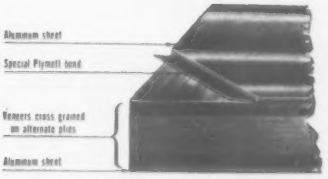
MAKES BETTER PRODUCTS POSSIBLE

Plymetl combines the light weight and rigidity of plywood with the strength of metal. Through 25 years of performance, Plymetl has proved its versatility, durability and dependability. When the War created shortages in supplies of critical metals Plymetl received still greater attention and wider use. Here Plymetl's performance in military equipment proved its worth as a basic structural material. For many applications Plymetl is unsurpassed. Where your product design requires a flat smooth surfaced material of unusual strength and light weight, a material unaffected by moisture and mold and fungi — and rust resistant — SPECIFY PLYMETL. A few of the more widely used types of Plymetl are described and diagramed below.

PLYMETL VE and EVE — A plywood plaque with zinc-coated steel sheet permanently bonded by an exclusive Haskelite method to one (VE) or both faces (EVE). Plymetl panels may be obtained in a range of thicknesses and sizes to suit specific applications. Simple wood-or-metal working tools will fabricate Plymetl.

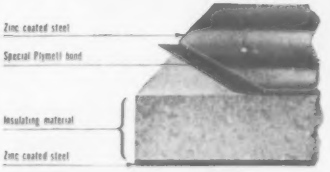


PLYMETL VU and UVU — A plywood plaque with aluminum sheet permanently bonded to one (VU) or both faces (UVU). The great strength and light weight factors of plywood are combined with the light weight of aluminum. Plymetl may be formed to certain curvatures.



PLYMETL ESE — A panel of insulating material with metal sheet permanently bonded to both faces (ESE).

Other types of core materials may be used to make varied kinds of Plymetl. To these cores, metal faces of monel metal, porcelain enamel steel, and stainless steel can be bonded. A core material may be faced with one type of metal on one side and another type on the other side. On all Plymetl panels, the metal faces provide an ideal surface for finishing.



Write for complete data on Plymetl, and bulletin SC45 which gives details on other types of Haskelite materials. Let Plymetl and Haskelite engineers help you design and build products that look better . . . sell better . . . and perform better.

HASKELITE

Dept. MM, GRAND RAPIDS 2, MICHIGAN

New York Chicago Detroit St. Louis Los Angeles Philadelphia

Canada: Railway & Power Engineering Corporation, Ltd.

Here's what
"KEX"
NATIONAL SERVICE
IS

. . . and why
your plant
can benefit from it

KEX NATIONAL SERVICE is a logical means of solving your industrial wiping problems by simply renting towels specifically made for wiping.

HERE'S HOW "KEX" NATIONAL SERVICE WORKS!

1

KEX NATIONAL SERVICE is as near as your telephone.

2

KEX INDUSTRIAL WIPING TOWELS are delivered to you in the quantities you want as you need them.

3

They are tied in neat bundles for easy storage, convenient handling and control of distribution.

4

KEX TOWELS are soft woven cotton—no abrasives to mar delicate surfaces—bound edges for safety—uniform in size—super-absorbent and clean.

5

Service is automatic—Pick-up of used towels and delivery of fresh ones are on a clock-work schedule that you make.

Manufacturers in every type of industry who have a wiping problem have found KEX NATIONAL SERVICE the efficient, economical way of solving it.

Look for this symbol in your local Classified Telephone Book. It identifies your nearest KEX distributor. Or write for details to KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N.Y.

"KEX" NATIONAL SERVICE
REG. U.S. PAT. OFF.

a rate of four seconds per point, according to manufacturer. Because each point is checked at such frequent intervals, it spots excessively high or low temperatures before serious trouble results. In case of trouble, any thermocouple can be cut out of the measuring sequence in banks of 20 at a time until the instrument is concentrated on any group of temperatures which need special watching. Or the instrument can be set to record any single thermocouple, or to record all points continuously. In usual operation, the instrument indicates the temperature while numbered lights identify each couple. Should any temperature reach a pre-set limit, the device automatically starts its recording chart drive, begins to record all points as a series of numbered dots, and operates an alarm. The equipment consists of two parts, a recorder and a switch assembly, each housed in its own case. Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44.

•

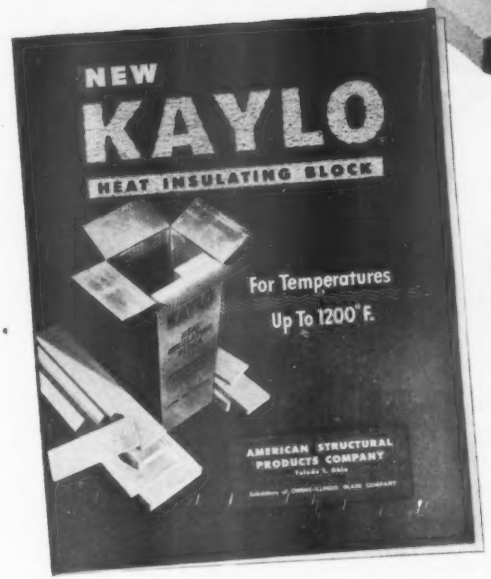
Small Pneumatic Chipping Hammer

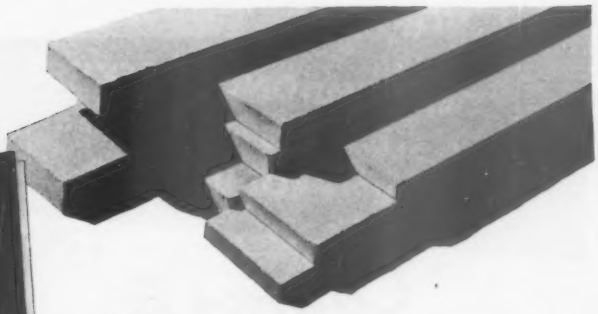
General-purpose chipping hammer features a jet blower device which cleans off work surfaces as it is used. Pulley valve design is said to provide smooth throttle action. Suitable for chipping of rust, scale, weld flux, soot, paint, and dirt, as well as for cutting old electric motor windings, chiseling wood, cutting oil grooves in large bearings, and similar jobs. The tool weighs approximately 4 pounds, is 10 inches long. Either a lever or push throttle is available, and a chisel is included. Chicago Pneumatic Tool Co., 6 East 44th St., New York 17.

•

Germicide

Germicide, called Santophen 1, is said to be effective against both fungi and bacteria, to be non-irritating in usage dilution, and to be free of objectionable odors. Although it shows phenol coefficients on the order of 150 to 200 against standard test organisms, and kills fungi in concentrations of 0.005 to 0.05 per cent, tests have shown that it is relatively non-toxic to higher animals, according to the manufacturer. It is a dry, non-dusting flaked solid, which can be formulated with commercial dispensing agents to give



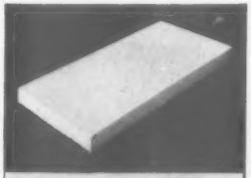


Now ready KAYLO®

LIGHT DENSITY Heat Insulating Block

BE SURE you get the facts about Kaylo Heat Insulating Block—the remarkable new insulation that's strong, lightweight and highly efficient.

Now in production in a new manufacturing plant, Kaylo Heat Insulating Block is being shipped in quantity for the first time. It has been in pilot plant manufacture for several years, and thousands of square feet of it are serving efficiently on typical heat insulation applications.



SEND COUPON
For Literature or Sample

Available in standard sizes, this new heat insulating block combines many valuable properties you should know about. Get complete information by mailing coupon below. No obligation, of course.

AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. F-413, P.O. Box 1035
Toledo 1, Ohio

Gentlemen:

Please send:
- ☐ Free illustrated booklet, "Kaylo Heat Insulating Block."
- ☐ Free sample of Kaylo Heat Insulating Block.
- ☐ Have representative call.

Name_____

Address_____

City_____ County_____ State_____

IS OLD-FASHIONED TACKING SLOWING DOWN YOUR PRODUCTION?

Change to DUO-FAST

TRADE MARK REG. U.S. PAT. OFF.

AUTOMATIC TACKERS AND WATCH PROFITS GO UP

Eliminate the hammer and nail brigade and bring your production up-to-date and actually ahead of schedule — increase your profits with Duo-Fast tackers. Fast—accurate, these tackers can do a complete job easily with one hand. They're excellent for tacking in awkward places.

There is an automatic Duo-Fast Tacker for every tacking job. All are fully guaranteed as long as genuine Duo-Fast staples are used.

The perfect combination for a job well done — Duo-Fast Gun and Hammer Tacker Team.

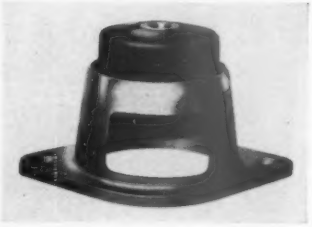
Write today for the Duo-Fast catalog on all Duo-Fast automatic tackers.

DUO-FAST FASTENER CORPORATION

862 Fletcher Street Chicago, Ill.

aqueous concentrations with high phenol coefficients. It is nearly colorless and does not stain or discolor surfaces. Suitable for use in sanitizing restrooms, disinfecting floors, walls, and equipment; deodorizing refuse cans; and treating locker rooms and swimming pool premises for the control of athlete's foot. Monsanto Chemical Co., St. Louis 4.

•



Vertical Snubbing Mountings

Designed to isolate vibration and control severe shock, holder-type vertical snubbing mountings are suitable for use where load capacity is from 120 to 310 pounds per mount. They may be used on both mobile and stationary equipment, and recessing is unnecessary. Manufacturer states that frequencies from 700 c.p.m. upward are isolated at their source, and that snubbing shoulders, in action during normal vibration, snub against steel washers when impact occurs, cushioning shock. Washers are designed to prevent excessive movement in overstressing of the flexing element. Three series of mountings are available: Series 279, with a deflection limit of $\frac{1}{8}$ inch, under load; Series 281, 3/16 inch; Series 282, $\frac{1}{4}$ inch. The flexing element is made of rubber or oil-resistant Neoprene, depending on the application. Metal parts are steel; malleable iron holders have two openings to provide bolt tightening with ordinary wrench. Lord Manufacturing Co., Erie, Pa.

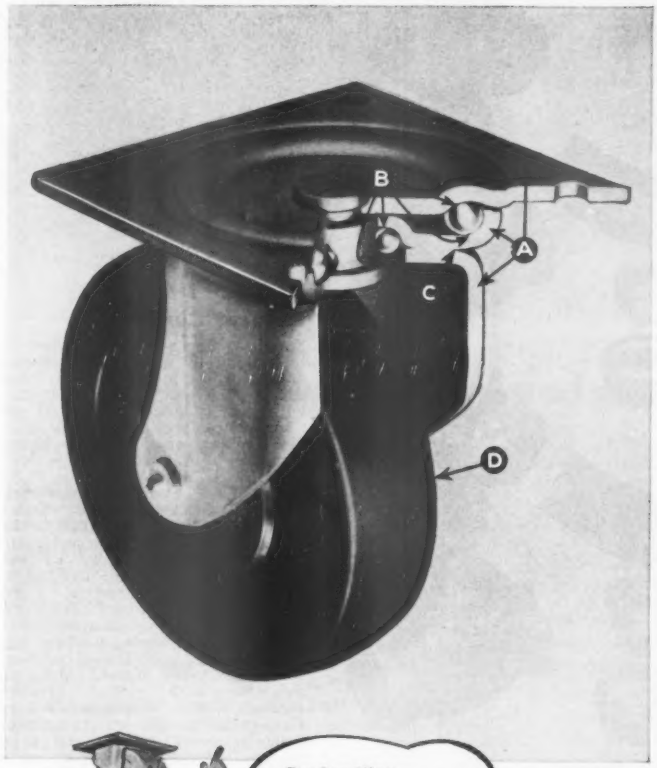
•

Power Saw

All-purpose wood saw features a 1-hp. motor driving a 10-in.-diameter saw blade, heavy-duty four-ball-bearing roller travel head riding on machined tracks inside the arm, and mechanical aligning adjustment at all moving positions. It may be used as a cutoff, mitre, rip, tilting arbor,

Bassick SERIES "99"

ALL PURPOSE...GENERAL DUTY INDUSTRIAL AND INSTITUTIONAL TRUCK CASTERS



A. Heavy gauge steel.

B. All bearing surfaces hardened; curved bearing surfaces give line contact with ball bearings.

C. Projection-welded assembly.

D. Highest quality wheels of soft rubber tread, solid composition or semi-steel.

3 ESSENTIALS FOR ECONOMY

1. Longer Life
2. Easier Swiveling
3. Low Original Cost

Made in sizes from 3" to 8", covering a wide range of load capacities, Bassick Series "99" Truck Casters are cutting costs in countless industrial applications. Get the whole story of how these top quality favorites in the world's greatest caster line can improve your own materials handling with easier operation, greater durability and unfailing dependability. See your Bassick representative or write to Caster Headquarters. THE BASSICK COMPANY, Bridgeport 2, Conn. DIVISION OF STEWART-WARNER CORP. In *Canada* — BASSICK DIVISION, *Stewart-Warner-Alemite Corp., Ltd., Belleville, Ontario.*

For handling your materials
No caster's near as fine
As Bassick's top-grade standouts
The Series "99"!

REDUCE YOUR COSTS
NATIONAL MATERIALS HANDLING SHOW
PHILADELPHIA JAN 10-14, 1949
VISIT OUR EXHIBIT

SOLD BY LEADING INDUSTRIAL DISTRIBUTORS

Bassick

Making more kinds of Casters... Making Casters do more

Simplify valve selection with this LUNKENHEIMER "RENEWO" THREESOME...

The "RENEWO" Threesome is fully described in Circular No. 577, which also explains the economy feature of converting one type to another by simply changing seat and disc. A copy is yours for the asking . . . from your Lunkenheimer Distributor or from us direct.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

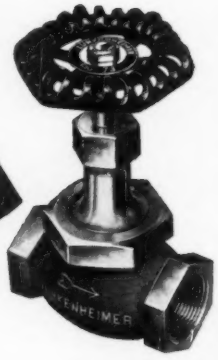
"QUALITY"

CINCINNATI 14, OHIO, U. S. A.

NEW YORK 13 CHICAGO 6

BOSTON 10 PHILADELPHIA 34

EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.



1 REGULAR TYPE...

Nickel Alloy Seat and Disc

Fig. 73 200 lb. S.P.

Fig. 16 300 lb. S.P.

Regular "RENEWO": one of the most popular and widely used valves ever designed for general service. As the name clearly implies, all parts are renewable.

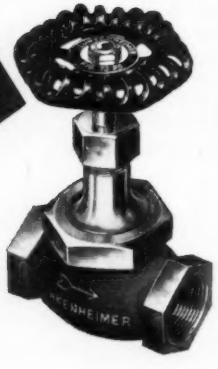
2 "P" TYPE...

Nickel Alloy Seat and Disc

Fig. 73-P 200 lb. S.P.

Fig. 16-P 300 lb. S.P.

"P" (Plug Type) "RENEWO": for throttling, drain, drip, water column blowdown and similar service. The "NS5" Nickel Alloy 330 Brinell seating material, developed and patented by Lunkenheimer, has exceptional wearing qualities and high corrosion resistance.



3 "PS" TYPE...

Nickel Alloy Seat and Disc

Fig. 73-PS 200 lb. S.P.

Fig. 16-PS 300 lb. S.P.

"PS" (Plug Type) "RENEWO": for maximum resistance to the effects of close throttling and other severe service, particularly where abrasive conditions are encountered. Equipped with stainless steel 500 Brinell seat and disc.

double mitre, and variety saw. Using a suitable tool, it becomes a dado, gaining, grooving, or rabbeting machine, or a shaper. Suitable for carpenter maintenance, pattern-shop work, crating and boxing, salvage, construction, and other types of wood-cutting operations. DeWalt, Inc., 201 Martha Ave., Lancaster, Pa.

•

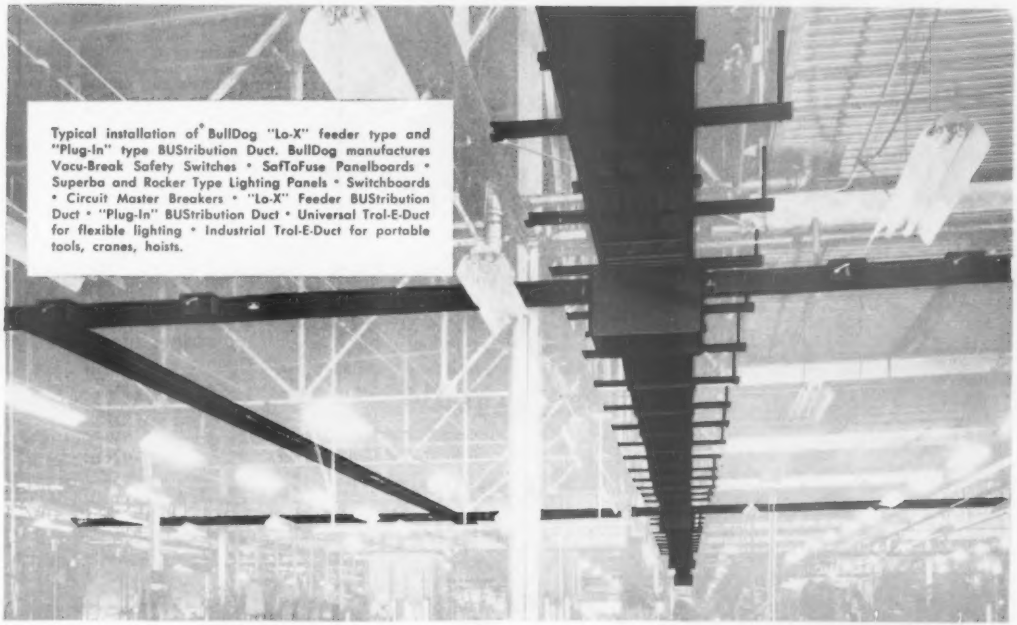
Dust-Tight Motor Control Center

For use where excessive dust or limitations in space are problems, dust-control center combines standard, general-purpose control units with heavily gasketed vertical sections. Each vertical section is an independent enclosure of heavy-gage steel. All seams are welded; the door is reinforced with strong hinges. A large vault-type door handle operates 3-point, roller-guided locking bars which clamp the door into place. Rear access plates have closely spaced mounting bolts for gasket tightness and handles for removal and replacement. Joints between sections at upper and lower wireways are also gasketed. Eyebolts on top facilitate handling. The motor control units are mounted entirely within the sections. Units are available with circuit breakers through 600 amperes, starters through NEMA size 5, lighting transformers, panel boards, and other devices. Master load and control terminal blocks are optional. Square D Co., 4041 North Richards St., Milwaukee 12.

•

Engine Exhaust Snubber

For use on 4-stroke-cycle diesel and gas engines with relatively short exhaust systems in stationary and portable service, and on 2-stroke-cycle gas engine compressors operating on the Otto cycle in the petroleum field, terminal exhaust snubber is avail-



Typical installation of BullDog "Lo-X" feeder type and "Plug-In" type BUStribution Duct. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panelboards • Superba and Rocker Type Lighting Panels • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution Duct • "Plug-In" BUStribution Duct • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, hoists.

Power with a foolproof future

CAN you foresee the many changes which may come to your plant in the next five or ten years?

Naturally not! But when it comes to electrical power distribution, BullDog BUStribution systems offer flexibility to meet any change the future holds.

Take machine layout changes: With BullDog "Plug-In" BUStribution Duct, moving machinery is like moving household appliances—simply unplug machine from duct, move, and plug in at new location.

If necessary, your entire BUStribution system can be easily and quickly dismantled, moved, and set up . . . without scrapping a nut or bolt—it's flexible and salvable.

BullDog "Lo-X" BUStribution Duct, for secondary feeders, is prefabricated to exact performance standards. Ventilated construction and paired-phase arrangement of silvered-copper bus bars reduces temperature rise, assures high current-carrying capacity and reduces reactive voltage drop. BUStribution Duct is sturdily built for years of finest service.

Your local BullDog Field Engineer will be glad to show you a BullDog BUStribution system in your own neighborhood. Let him look over your requirements and answer your questions.

BullDog's Field Engineers welcome the opportunity to sit in with you during the early planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation costs, as well as efficiency and reliability in actual operation. Why not take advantage of this service?

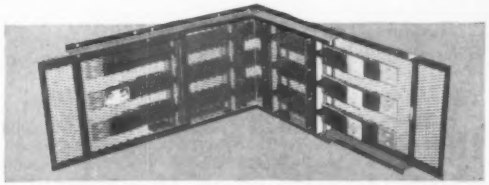
BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

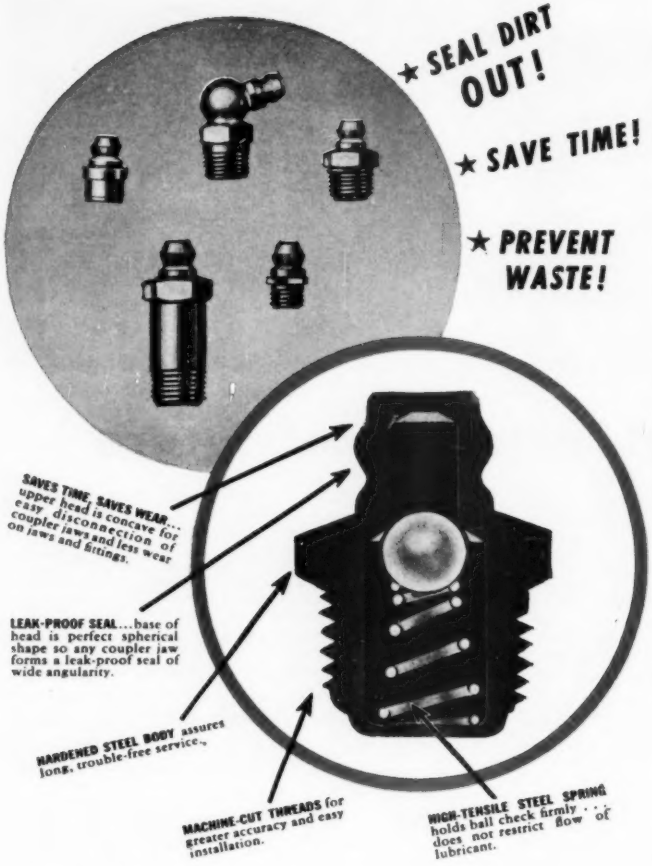
HEADQUARTERS FOR ELECTRICAL DISTRIBUTION



Section of "Lo-X" BUStribution Feeder Duct, used for main secondary power feed. "Lo-X" Duct is prefabricated in ten-foot lengths, in capacities from 600 Amps. to 4000 Amps., 600 Volts or less. Close spacing and paired-phase arrangement of bus bars reduces reactive voltage drop.

Section of "Plug-In" Duct, showing Vacu-Break Bus Plug for tap-off purposes. Crescent-shaped openings make it impossible to insert plugs incorrectly. Each ten-foot section of "Plug-In" Duct has ten such openings. Capacities: 200 Amps. to 1350 Amps., 600 Volts or less.

ARO Grease Fittings FOR EVERY NEED


★ SEAL DIRT OUT!
★ SAVE TIME!
★ PREVENT WASTE!
SAVES TIME, SAVES WEAR... upper head is concave for easy disconnection of coupler jaws, and less wear on jaws and fittings.
LEAK-PROOF SEAL... base of head is perfect spherical shape so any coupler jaw forms a leak-proof seal of wide angularity.
HARDENED STEEL BODY assures long, trouble-free service.
MACHINE-CUT THREADS for greater accuracy and easy installation.
HIGH-TENSILE STEEL SPRING holds ball check firmly . . . does not restrict flow of lubricant.

Specify ARO Grease Fittings for every lubrication point . . . they're precision-made . . . accurate . . . rugged . . . dependable. Can be serviced by all leading brands of hydraulic couplers. Complete range of types and sizes . . . Aro-built Quality. Write for Catalog 102. The Aro Equipment Corporation, Bryan, Ohio.

ARO GREASE FITTINGS
ALSO...LUBE EQUIPMENT...AIR TOOLS
HYDRAULIC EQUIPMENT
AIRCRAFT PRODUCTS

able in pipe sizes from 5 to 14 inches. Designated as Series SDT, the unit combines a tail pipe with the exhaust snubber and is intended for vertical mounting at the end of the exhaust system. Maker states that the unit provides noise control by dissipating the energy of the exhaust gas before it is released to atmosphere. Burgess-Manning Co., Libertyville, Ill.

•

Powder Fire Extinguisher

Dry chemical fire extinguisher, designed for use against flammable liquid and electrical fires, is made in 20- and 30-lb. capacities. It contains a dry powder mixture that is said not to pack or obstruct discharge, and is operated with one-hand trigger-finger control. When the lockpin in the handle is removed and the trigger pulled, the powder chamber is pressurized by carbon dioxide released from the small cylinder mounted on the side. Simultaneously, the powder release valve in the top of the main powder chamber opens, discharging fine powder through the hose and nozzle in a swirling stream that carries 20 feet or more, according to the manufacturer. Pressure is maintained as long as the trigger is held open and until the extinguishing powder is completely expelled. Maker states that if the trigger is released before all the powder has been expelled, the pressure is maintained in both the carbon dioxide and powder chamber, so that the extinguisher can be put into action again with no time lag. Walter Kidde & Co., 40 East 34th St., New York 16.

•

Non-Glare Aluminum Blinds

Aluminum-slat blinds, called Ra-Tox Analum venetian blinds, have a non-glare finish, known as Alumilite No. 90. Manufacturer states that this finish is an anodic treatment, applied electrolytically, so as to produce a dense integral coating of aluminum oxide to reduce sun glare and eliminate reflection. Blinds are also said to be durable, to have high resistance to atmospheric corrosion,

enclosed gear drives...

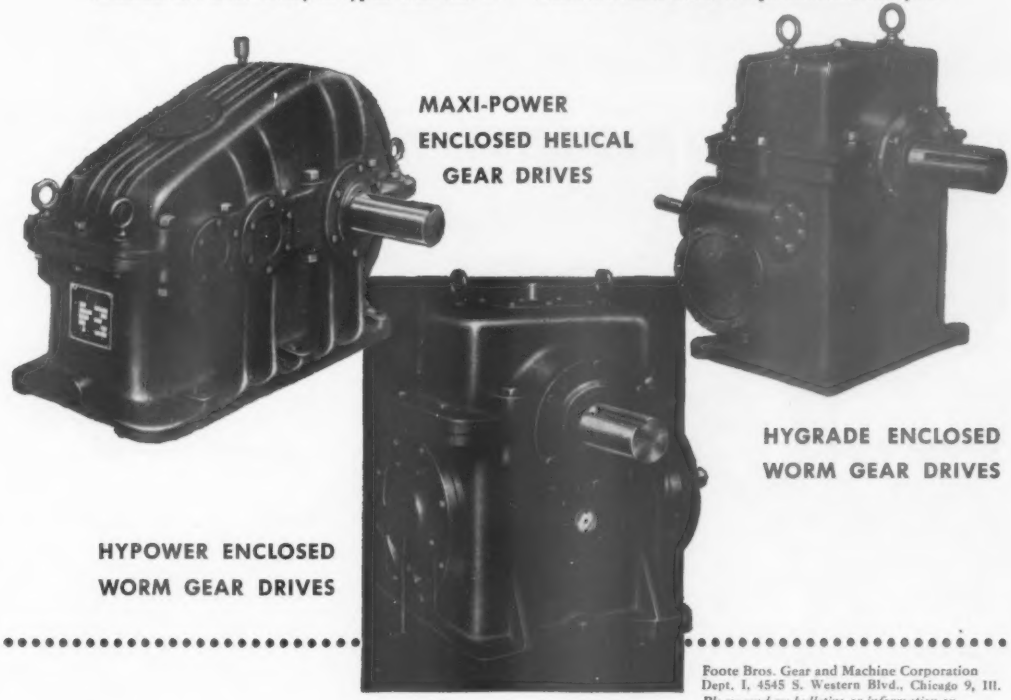
for every industrial need!

Foote Bros. Hypower Worm Gear Drives, both horizontal and vertical types, offer new economies in space, weight and cost. Increased load-carrying capacity is accomplished by a revolutionary technique in generating gears. The oil bath is cooled by passing a high velocity stream of air through an air channel cylinder immersed in the bath. This provides greatly increased thermal capacity.

Foote Bros. Hygrade Worm Gear Drives are available in a wide variety of types. This line is newly designed and includes sizes and ratios to meet practically any requirement.

Foote Bros. Maxi-Power Helical Gear Drives are available in single, double and triple reductions. This newly developed line assures maximum performance made possible by the latest in engineering development and by improved methods in manufacture.

Regardless of what your requirements in gears or enclosed gear drives may be, call on Foote Bros. There is a sales office or representative near you.



MAXI-POWER ENCLOSED HELICAL GEAR DRIVES

HYGRADE ENCLOSED WORM GEAR DRIVES

HYPOWER ENCLOSED WORM GEAR DRIVES

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION

Dept. I, 4545 South Western Boulevard • Chicago 9 Illinois

Foote Bros. Gear and Machine Corporation
Dept. I, 4545 S. Western Blvd., Chicago 9, Ill.
Please send me bulletins or information on

- ☐ Hypower Enclosed Worm Gear Drives
- ☐ Hygrade Enclosed Worm Gear Drives
- ☐ Maxi-Power Enclosed Helical Gear Drives

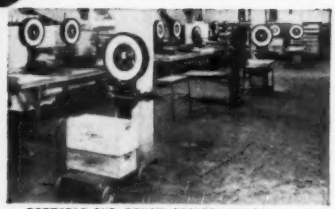
Name .....

Company .....

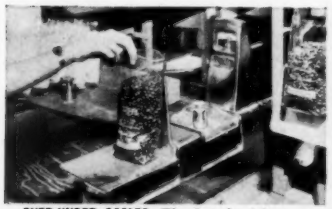
Address .....

City ..... *State*

COUNTING SCALES—These Toledo Scales count small parts rapidly and accurately.

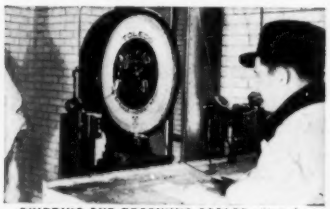


PORTABLE AND BENCH SCALES—Widely used for weight-and-cost-control throughout modern plants.

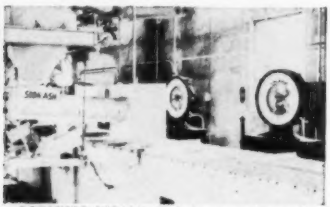


OVER-UNDER SCALES—The Speedweigh saves time in packing, filling, check weighing.

TOLEDO PRINTWEIGH SCALES stop errors . . . print BIG figures—ACCURATE weights—with split-second speed!



SHIPPING AND RECEIVING SCALES—Toledo Accuracy prevents small errors from multiplying into big losses!



BATCHING SCALES—Toledos save time and safeguard quality . . . make batching quick and sure.

Guard Costs with

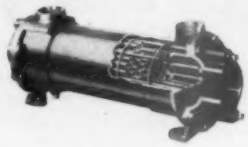
TOLEDO

All the Way!

SEND for ➤ Bulletin No. 2020. Toledo Scale Co. Toledo 12, Ohio

and to be capable of withstanding salt spray and sulphurous gases. They resist roughening from weather and will not crack or chip, maker states. Slats have rounded corners, are constructed of aluminum sheeting 2 inches wide by 0.010 inches thick, have flexibility to permit a transverse bend of $1\frac{3}{4}$-in. radius. Non-slip bead chains permit tilting and automatic cord lock holds blinds at any required point. The Hough Shade Corp., Janesville, Wis.

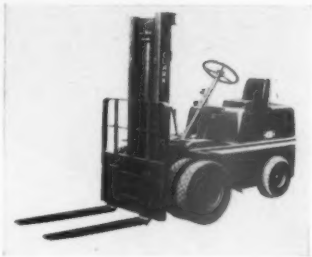
•



Heat Exchanger

Line of standardized heat exchangers, for diesels, gas engines, compressors, hydraulic machines, blowers, and similar applications, is suitable for cooling, heating, or condensing liquids, vapors, or gases. Manufacturer states that weight has been reduced by using brass forgings instead of castings for bonnets and hubs in the smaller sizes, and that the shell and tube design provides adaptability. Tube joints are leak-proof, and all units are equipped with zinc corrosion eliminators. Available in single-, two-, and four-pass models. Ross Heater & Mfg. Co., 1407 West Ave., Buffalo 13.

•



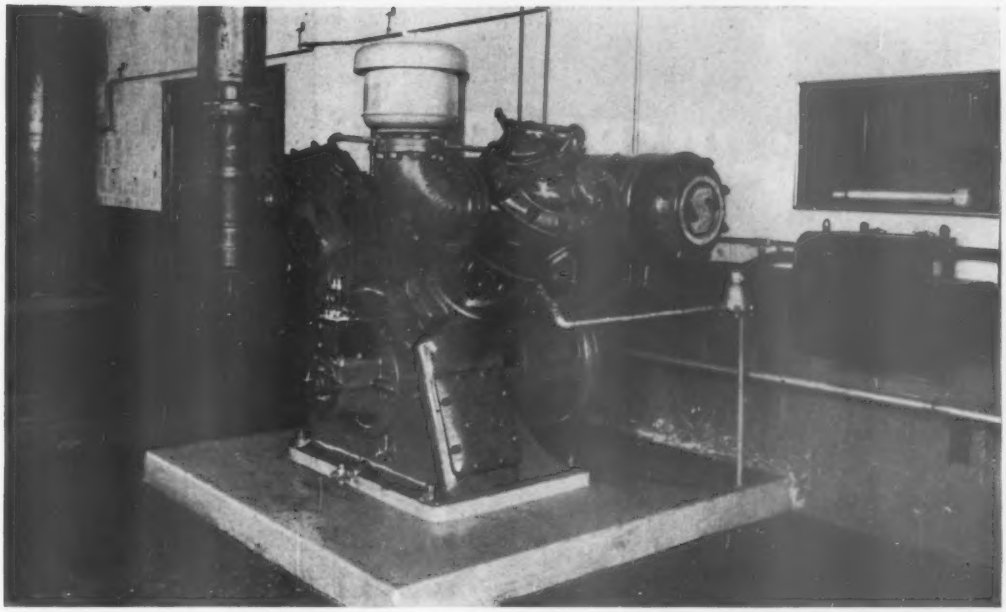
Truck Axle for Dual Tires

Said to provide stability and safety in high-lift operation of pneumatic-tired fork trucks, wide drive axle, mounting dual tires, is suitable for use on manufacturer's Yardlift "40" models where operations require lifts of more than 144 inches. Maker says dual tires are said to provide traction and flotation over soft ground and other uneven surfaces. The wide axle is available for either factory or field installation. Attachable fenders are included. Clark Equipment Co., Industrial Truck Div., Battle Creek.

•

Emulsion Cleaner

Ready-to-use emulsion cleaner, MUL, combining solvent and emulsion cleaning is said to remove waxy and



Here's top efficiency in the 400 to 1800 c. f. m. range!

The JOY WN-112 AIR COMPRESSOR

Built in sizes from 378 to 1828 CFM, the JOY WN-112 is a two-cylinder, two-stage, heavy-duty compressor with the exclusive JOY "Dual-Cushion" valves for top efficiency. Compact and highly modern, it saves space and cuts installation costs. ● JOY builds the most modern compressors available for either centralized or de-centralized air supply—*write for Bulletin.*

The JOY WL 80, in nine sizes from 81 to 590 CFM.

The JOY WG 9, in eleven sizes from 153 to 822 CFM.

The JOY WN 114, in single or twin units, 1092 to 7312 CFM.

Consult a Joy Engineer

W&D 12065

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

HEIN-WERNER HYDRAULIC JACKS

THE SUPERIOR INDUSTRIAL JACK

If you like to figure out short cuts, devise easier ways of doing things, or develop "special equipment" which will enable a factory to turn out better work in less time, you'll find many applications for H-W Hydraulic Jacks. They're great for many different moving, bending, pressing, pushing or lifting operations.

Made in models of 1½, 3, 5, 8, 12, 20, 30, 50 and 100 tons capacity. Consult your nearest industrial supply distributor or write us for details.

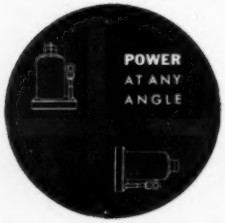
LARGE SOLID STEEL BASE gives firm, solid footing, prevents tilting under load.

PRESSURE TESTED malleable iron used in top nut and in handle sockets afford extra strength at points of greatest strain.

HEINITE PISTON is an exclusive H-W achievement. It withstands ten times the wear of conventional cups or packing.

CANNOT LOWER ACCIDENTALLY as handle must be removed from pump to open release valve.

ALL H-W MODELS are factory-tested at 1½ times their rated capacity.



Hein-Werner HYDRAULIC JACKS

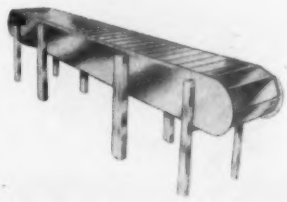
HEIN-WERNER CORPORATION • WAUKESHA, WIS.

greasy buffing and grinding compounds. Manufacturer states that it resists hard water attack, minimizes curd formation, and is inhibitive against foaming even in high-pressure washers. It is described as non-toxic, with a high flash point, free from objectionable odors, and non-corrosive. It may be used on any metals and soft or painted parts, according to the manufacturer. It is intended for emulsion cleaning in industrial washers, for wipe-down maintenance cleaning, for interim rust inhibiting during production and short-time storage, and for pre-wetting before alkaline cleaning or vapor degreasing. The Du Bois Co., Cincinnati. •

Fiber Glass Heating Panels

Developed to produce high-temperature uniform heat for industrial processing, heating units, called "Super-Heaters," are designed with electrical filaments closely woven in fiber glass. The panels may be used horizontally, with the face either up or down, or used vertically to heat material from one or both sides. The unit may be curved for adaptation to specific requirements, or designed for attachment to present equipment.

When used in series, panels can be set to operate at one temperature, or temperatures on each unit may be varied to supply staggered increases or decreases. Special units for temperatures in excess of 700 deg. F. are built to specifications. Units are constructed of lightweight metal and fiber glass with a minimum of clearance between the heater and material to be processed. Blower units are provided to circulate the air where moist air or noxious fumes must be driven off. Sill Paper Co., Inc., 51 Madison Ave., New York 10. •



Aluminum Conveyor

All aluminum conveyor, suitable for moving parts and assembled goods

Only GOULD Has It!

A modern research laboratory with pilot manufacturing plant where advance-design batteries are constantly created—and proved before production.

The Metalloscope, a combination high-powered microscope and camera, is helping Gould scientists find the answers to age-old lead casting problems. With it, the complex crystalline structure of lead castings has become an open book. As a result, information rapidly becoming available points the way to even stronger, electrically more efficient grid frames, posts, straps and connectors. For better batteries always, choose GOULD—FOR FIFTY YEARS THE CHOICE OF ENGINEERS.

The Gould "Thirty"—America's Finest Industrial Truck Battery!

GOULD

STORAGE BATTERY CORPORATION

Including the Storage Battery Division of Philco Corporation

TRENTON 7, NEW JERSEY

Always Use Gould Automobile and Truck Batteries

It means, Mr. Manufacturer, that your products get protection. The kind of protection that ends costly complaints, that keeps your customers happy, that *keeps* your customers.

It means that General Boxes are designed to the product . . . that they are actually "A Part of the Product." They are lightweight, compact, extra strong! You save freight, storage space, and gain added protection!

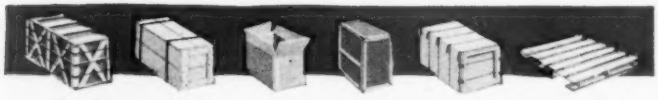
We'd like to tell you more about the very real benefits to you of General Boxes. Won't you write us today?

General Box Company has had more than 25 years of experience in manufacturing shipping containers. Furthermore, our two modern Designing and Testing Laboratories are available for the improved packing of your product. Booklet below gives complete details.

General BOX COMPANY
★★★★★
...engineered shipping containers

GENERAL OFFICES: 504 N. Dearborn St., Chicago 10.
DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez.
Continental Box Company, Inc.: Houston, Dallas.

Send for your copy. It shows how you too can cut costs.



from assembly lines to shipping point or storage space, features a sagless and vibrationless belt-plate top which moves at variable speeds up to 100 f.p.m., in either direction. Belt is fastened to a link-chain arrangement hooked up with drive sprockets to provide a smooth, vibrationless drive.

Conveyors are available in 5-ft. sections. Each foot of belt is supported by eight or more rollers. Conveyors 18 inches and wider have an added center channel support for greater load capacity. Belts are available in widths from 6 to 96 inches, and lengths up to 175 feet or more, depending upon requirements. Cleats may be fastened to the belt plate to adapt the conveyor to incline movement. The drive-end of the conveyor houses the sprocket assembly with belt link hook-up, the variable speed reducer, and the electrical reversing controls. Mercury Conveyors, Inc., Hillsdale, N. J.

•

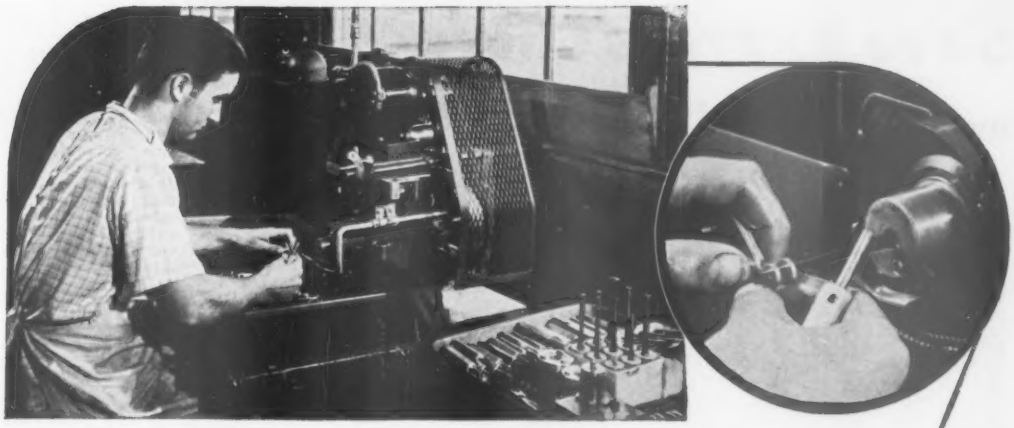
Safety Helmet

Molded plastic safety helmet, called Hard Boiled Hat, has a crown made of interlocked fibres, impregnated and bonded with a resinous binder. It is water- and moisture-proof and non-conducting. Other features include its shock-absorptiveness and uniform resistance to fracture under impact. Wide-web, adjustable hammock (or inner cap) protects the neck. The entire hammock assembly, including sweat band, is supported by six wedge-type hangers permitting removal for cleaning or replacement. Hammock drawstring permits fitting to any head shape. The sweatband is adjustable from size $6\frac{5}{8}$ to $7\frac{5}{8}$. Accessories include a lamp bracket that accommodates either electric or carbide lamps; chin straps; and winter liners, which replace the standard hammock. E. D. Bullard Co., 275 Eighth St., San Francisco 3.

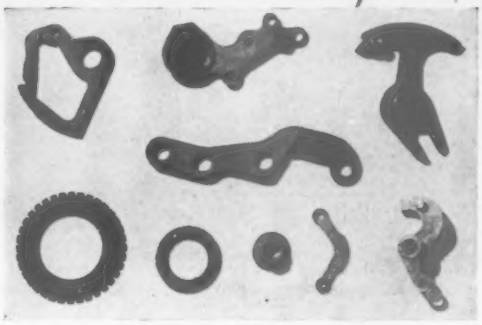
•

Evaporative Condensers

Line of eight evaporative condensers uses both air and a water spray to cool hot refrigerant vapor and change it into a liquid during the refrigerative or air-conditioning cycle. Units operate as separate, remotely installed condensers, and are used with matched evaporative-type compressors which are built without condensers. Fans draw air into the unit through an intake grill while



The National Cash Register Company Uses SUNNEN HONING to Remove Burrs and Heat-Treat Distortion *Quickly* and at LOW COST



Some of the parts which are Sunnen Honed at The National Cash Register Company, Dayton, Ohio

Sunnen Honing is used by The National Cash Register Company to produce accurate internal diameters and smooth surfaces that contribute to the long trouble-free service of its products.

These Precision Honing Machines are used at National Cash Register on a wide variety of parts with holes ranging from ¼" to 1¾" in diameter. Tolerances for straightness and roundness as low as .0004" are easily held—production rates are high—and rejects are almost eliminated.

Sunnen Precision Honing Machines are a profitable investment wherever smooth accurate diameters must be produced:

- **Honing range from .120" to 2.625" in diameter—Including blind holes and bores with keyways.**
- **Hones all metals, ceramics, glass, steel, cast iron, bronze, brass and aluminum.**
- **Holes are accurate to .0001" — Sunnen honing corrects out-of-roundness, distortion, bell-mouth and taper.**
- **Machine produces any surface finish required — no high spots, chatter marks.**
- **Fast set-up; quick change-over of sizes makes Sunnen honing profitable even on short runs.**

Write for bulletin or, on request, a Sunnen engineer will be glad to show you the advantages of Sunnen Honing in your plant.

SUNNEN PRODUCTS COMPANY

TRADE MARK REG. U. S. PAT. OFF. • MARCA REGISTRADA

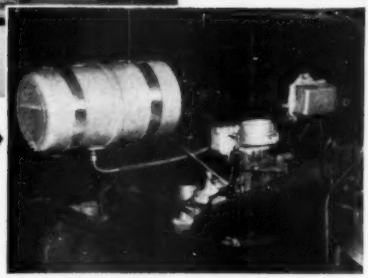
7991 Manchester Ave., St. Louis 17, Missouri • *Canadian Factory: Chatham, Ontario*

378

Save Express Charges by Bundling Shipments

Acme Steelstrap helps shipper cut express costs 43% by bundling cartons and shipping them as a single unit

THE TEST SHIPMENT THAT PROVED THE SAVING! Here are four Octa-Gane carburetors and supply tanks, bundled as an Acme Uni-Pak. Express charges when shipped separately were $4.01—as a bundle, $2.26. Cash saving, $1.75, or 43%.



THE OCTA-GANE WATER INJECTION CARBURETOR, developed during the war for aircraft use, is now being applied to trucks, tractors, and passenger automobiles to get better, more economical gasoline consumption. This photograph shows typical passenger car installation.

Here is a cost-cutting idea you may be able to apply now—today—to save on shipping charges for your company.

Octa-Gane carburetors, made by Exola Products, Inc., of Los Angeles, are packed for shipment in five-pound cartons. Separate express shipments of less than 10 pounds to one consignee at one destination are charged for on the basis of 10 pounds minimum per package.

An Acme Shipping Specialist quickly demonstrated a big saving by bundling four cartons into one package with Acme Steelstrap.

In a cost comparison test, four Octa-Gane carburetors and supply tanks shipped singly cost $4.01 in express charges, while an Acme Uni-Pak bundle of four cartons cost only $2.26—a cash saving of 43%.

For cost-cutting ideas on your shipping problems, call the Acme office nearest you, or write us. Or mail the coupon today for more true case histories of "SAVINGS IN SHIPPING," with Acme methods.

Doc Steelstrap

STRAPPING DIVISION

ACME STEEL COMPANY

Acme Steel Company, Dept. FM-19
2838 Archer Avenue, Chicago 8, Illinois

Please send me a copy of your case history booklet, "SAVINGS IN SHIPPING."

Name_____

Company_____

Address_____

City_____ Zone____ State_____

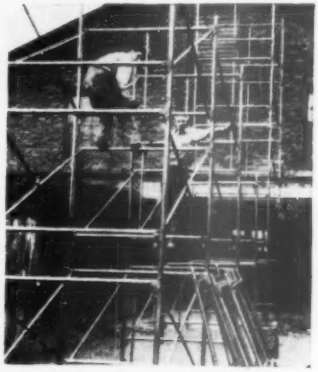
Acme Steelstrap

ACME STEEL CO. CHICAGO

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

water is sprayed into the air stream, wetting the surface of the condensing coil, which contains hot refrigerant vapor from the compressor. This vapor, cooled by the joint action of the air and water, is restored to its liquid state, moving to the cooling unit. All the condensers, with the exception of the 2-ton-capacity model, are composed of three parts, including fan, coil, and base sections. Manufacturer states that the condensers, by employing forced air and a pressure water spray, may reduce water consumption as much as 90 per cent. Frigidaire Div., General Motors Corp., Dayton 1

•



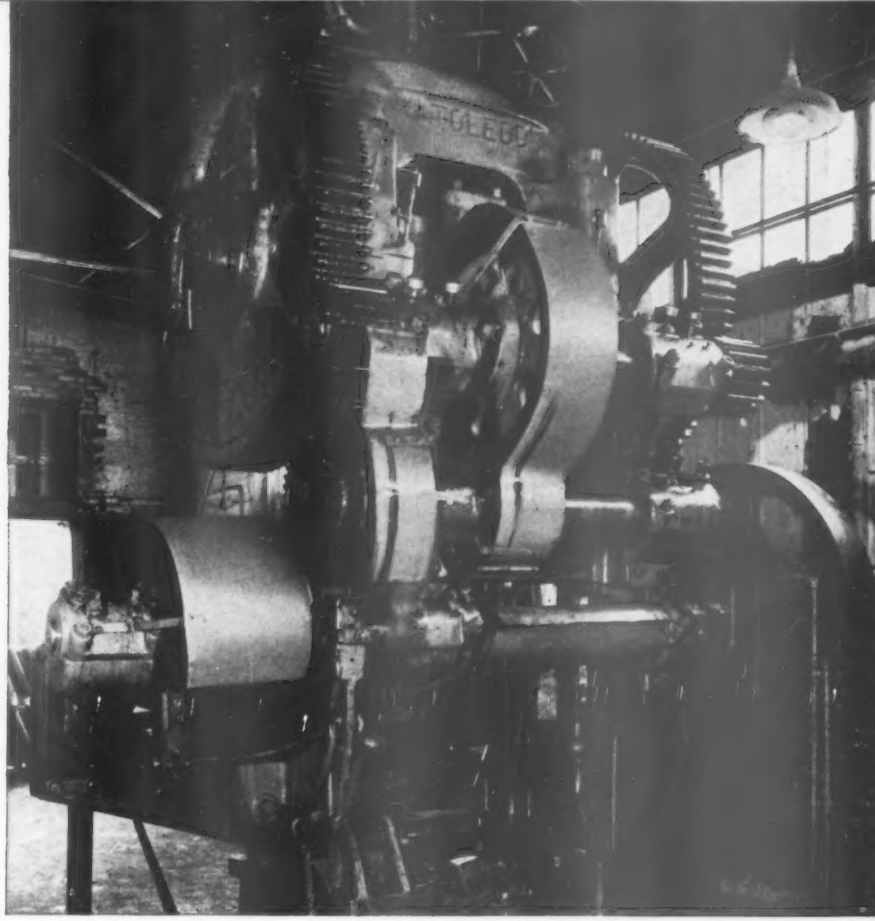
Tubular Steel Knock-Down Scaffold

Double-welded at the girt joints, tubular steel knock-down scaffold features joining cross-braces using a cam lock, said to provide positive assembly as well as fast knock-down. Every part is self-contained, eliminating clamps, nuts, bolts, or toggle pins. Fifteen different parts are said to make up scaffolding for practically any type of job, including structural, masonry, siding, painting, or maintenance. Designed for a load of 50 p.s.f. on 7-ft. spans at a height of 125 feet with a safety factor of 4. Advance Scaffold Div., Beaver Art Metal Corp., Box 792, Ellwood City, Pa.

•

Lift Truck

Electric tractor, the Hydrolectric "KTL," was designed to pull live and semi-live skids carrying heavy



Where gears are open for trouble, try...

THE exposed gears on stamping machines were a source of considerable trouble in a midwest plant. Noisy operation and lubricant throw-off created an undesirable working condition for the press operators. Moreover, gears required frequent applications of grease, interfering with production and raising lubricant consumption.

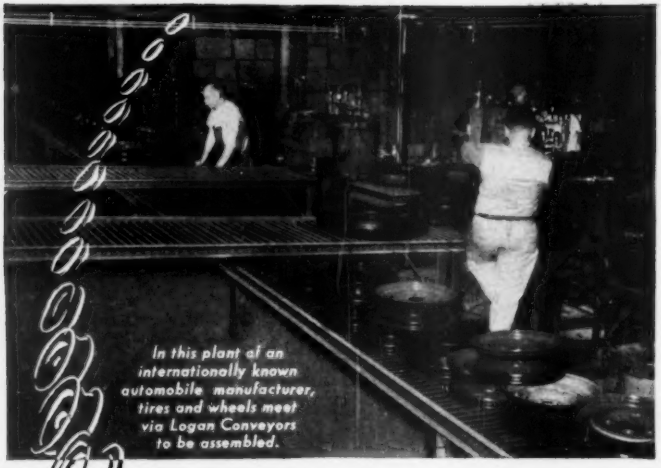
Conventional greases, tried on the gears, failed to remove the difficulties. A Standard Oil Lubrication Engineer suggested the use of Calumet Viscous Lubricant No. 2X, a grease of superior adhesive quality. This lubricant clung to the gears, eliminating drippage and throw-off troubles. Fewer applications of the grease were required. Gear operation was smoother and quieter.

Where open gears, as well as some enclosed types, are difficult to lubricate, try Calumet Viscous Lubricants. Unlike many conventional gear shields, these lubricants are true greases, fortified with additives. Their superior adhesive quality and greater wetting ability give them high resistance to the washing action of water and to thinning and throw-off at high temperatures. All grades of Calumet Viscous Lubricants can be applied without heating, and all but the heaviest grade can be applied by spraying.

Calumet Viscous Lubricants

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill., to secure the services of the Standard Oil Lubrication Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD


In this plant of an internationally known automobile manufacturer, tires and wheels meet via Logan Conveyors to be assembled.

HELPING WHEELS to get around

Logan Conveyors act as "match-maker" by delivering tires and wheels to assembly stations where operators combine them into one unit . . . send them swiftly on their way.

A typical example showing how Logan Conveyors provide manual-free movement of materials at the required productive pace and at convenient working heights for workers.

It is quite likely that an extension of your use of conveyors will provide that increased output so desirable today—without requiring a longer work day or greater effort on the part of operators.

Literature sent on request.

Logan Conveyors

LOGAN CO., INC., 510 CABEL ST., LOUISVILLE 6, KY.

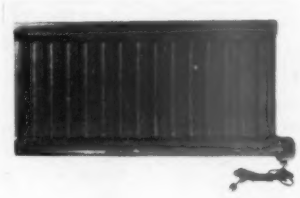
loads. A wheel base of 40 inches permits short turns in close quarters. Power hydraulic jack at the rear of the tractor lifts the front end of the skid. Two speeds forward, two in reverse, and dynamic brakes are all pushbutton controlled. Other features include two front driving wheels and a differential transmission sealed in lubricant. Lift Trucks, Inc., 2425 Spring Grove Ave., Cincinnati 14.

•

Metal Blueprint Cabinet

Intended for use in filing blueprints and drawings, steel cabinet, called the Draw-In-Dex, accommodates up to one thousand prints, any of which can be removed or replaced without disturbing the others, according to manufacturer. It measures 20x30 inches, and is 4 feet high. When filed in this cabinet, indexed prints or drawings hang on hinged suspension rods. When the cabinet's front panel is opened, the rods slide apart to allow the prints to be removed or inserted in their indexed position. Built-in index cards and locks are standard equipment. Empire Development Corp., 209 Union Trust Bldg., Washington, D. C.

•



Oil-Heated Electric Radiator

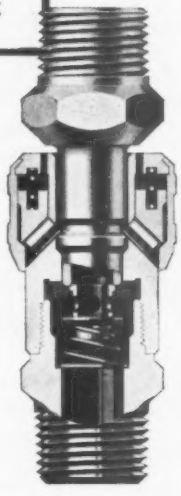
Pressed steel radiator unit, which may be used for central heating, to supplement present heating system, or to supply temporary heat, is electrically heated through the medium of hermetically sealed oil and thermostatically controlled. It is filled with a low-expansion oil, perma-

WITH HANSEN COUPLINGS

minutes SAVED are hours GAINED

QUICK-CONNECTIVE COUPLINGS FOR

- AIR
- ACETYLENE
- OIL
- GASES
- GREASES
- STEAM
- OXYGEN
- HYDRAULIC



REPRESENTATIVES

New England States: Pearse-Pearson Co., West Hartford, Connecticut. Boston, Massachusetts
Atlantic, Gulf States: B-R Engineering Co., Baltimore, Md.
Northern Ohio: F. & W. Ursem Company, Cleveland, Ohio
Southern Ohio, W. Va., Northeastern Ky.: Steinhagen Airline Products, Dayton, Ohio
Tennessee, Arkansas, Kentucky: Ralph A. Hiller Co., Nashville, Tennessee
Michigan: William H. Nash Company, Detroit, Michigan
Indiana, Wisconsin: Neff Engineering Company, Ft. Wayne, Indiana. Milwaukee, Wisconsin
Northern Illinois, Eastern Iowa: Walter Norris Engineering Company, Chicago, Ill.
Central Midwestern States: Sturgis Equipment Co., St. Louis, Mo.
North Midwestern States: Hanscome-Rogness Company, Minneapolis, Minnesota
Texas, Oklahoma: C. C. Brownfield Dallas, Texas
Colorado, New Mexico, Utah, Wyoming: E. C. Wild Co., Denver, Colorado
Northern Cal., Nevada: R. J. Gentles, San Francisco, California
Arizona, S. California: Chester Paul Co., Glendale, California
Idaho, Oregon, Washington: Jack J. Kolberg Company, Seattle, Wash.

IN CANADA

Province of Ontario: John Best Associates, Toronto, Ontario.
Quebec & Maritime Provinces: Cowper Company Ltd., Montreal, Que.

CONNECTION TAKES ONLY A SECOND

Threading fluid line couplings on and off to connect or disconnect is an unnecessary waste of time. Any line can be quickly and easily connected by using a Hansen Coupling. And, in addition, couplings have shut-off features that prevent loss of the liquid or gas in the line.

When you want to connect a Hansen Coupling, it is merely necessary to push the plug into place, where it locks securely. The valve opens, and flow starts instantly. The same operation disconnects—move the sleeve, and the plug pops out. Flow is shut off automatically.

From a wide range of available sizes and types you can select one suitable for any application. Air, oil, and gas, oxygen and acetylene, gasoline, hydraulic oil, and steam—each type of service has a Hansen Coupling engineered to meet its specific requirements.

If you have any fluid lines in your plant, you can increase efficiency, save precious minutes, by the use of Hansen Couplings.

Write for industrial catalog No. 47 today

QUICK CONNECTIVE FLUID LINE COUPLINGS . . .

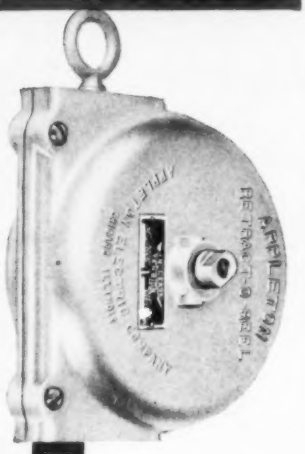
THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

APPLETON

Retract-o-Reel

takes DEAD WEIGHT OUT OF TOOL-WORK



Put the Appleton Retract-o-Reel to work any place where power tools are used and watch it pay for itself in production-improving efficiency!

The Retract-o-Reel saves man hours. It saves money in the prevention of tool wear. It saves morale by providing worker convenience, preventing worker fatigue.

Here's how it operates:

The Retract-o-Reel carries all the weight of the power tool, allowing the operator's attention and energy to be entirely focused on close, accurate work. When a job is completed, the Retract-o-Reel lifts the tool up out of the way, suspending it within easy reach for the next operation.

Spring tension is easily adjusted to exactly counterbalance the weight of any electric or air-operated tool weighing up to ten pounds. Sturdily built with a solid cast-aluminum, dirt and dust-proof housing, the Retract-o-Reel needs practically no attention. Put it to work for you soon.

Spring-Operated Balancing Reel for Portable Tools

SEND TODAY! For 50-page Bulletin 504, describing the entire line of Appleton Portable Reelites, Retract-o-Reels, and Constant Duty Types. Also special reels for power tools, air and fluid lines. Or see Sweet's File, 1948, page 2a/15.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1715 WELLINGTON AVE. • CHICAGO 13, ILL.

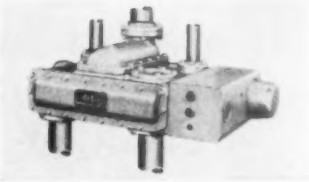
14 Branch Offices and 7 Resident Representatives in all principal markets

APPLETON

CONDUIT FITTINGS · LIGHTING EQUIPMENT · OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS · REELITES

nently sealed, and, manufacturer states, once installed, requires no maintenance and no change in oil. An electrical element, welded into the radiator or panel wall type pressed steel unit, heats the oil, providing a low surface temperature of 160 deg. F., according to manufacturer, who states that the heat is dispersed over a radiating surface of 20.15 square feet per kilowatt. Unit is available in twelve models of various types and design in wall units, as well as the floor-type radiators. Hurseal Corp. of America, 250 Park Ave., New York 17.

•



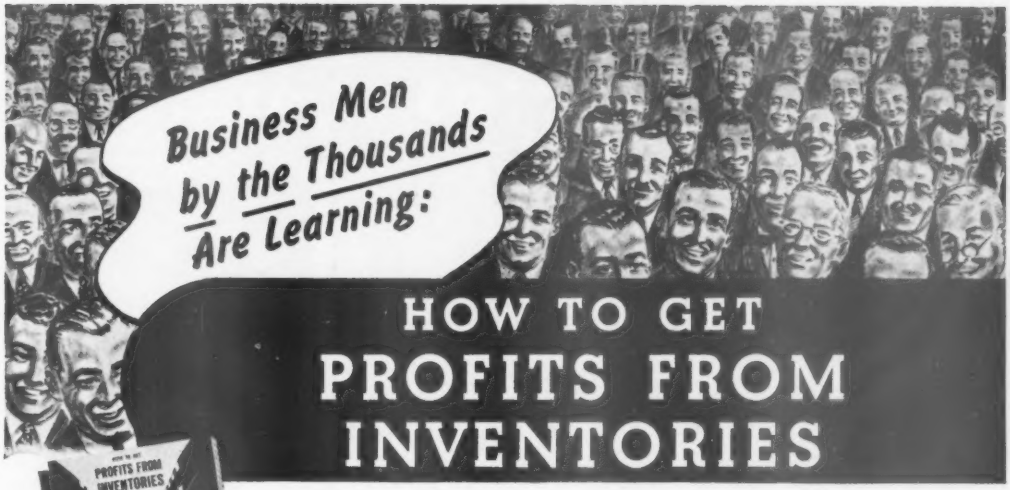
Multiport Valve

Leak-proof multiport valve, for use in water purification, is said to eliminate rubbing rotor, high-pressure loss, sticking plugs, and to be free from water hammer. It features interchangeable and replaceable seats and disks. Because water pressure is employed to help open the cam-operated poppet system, operation requires a single 1/20-hp. motor. Belco Industrial Equipment Division, Inc., 42 Iowa Ave., Paterson 3, N. J.

•

Deep Burden Electromagnet

For use in removing tramp iron from exceptionally heavy burdens of material carried on belt conveyors or passing down chutes, triple-pole rectangular magnet is designed with extra coil windings, which, according to the manufacturer, result in an intensity of the magnet field of 200 gausses at 24 inches from the surface. In order to dissipate the heat generated within the magnet, ribs are placed on the sides, and aluminum extensions run internally from coil to case to assist in the conduction of heat. Can be installed suspended over conveyor belts, spouts, or chutes and is designed for any application



HOW TO GET PROFITS FROM INVENTORIES

as described in this timely, FREE book. SEND FOR YOUR COPY TODAY.

tells you . . .

- How to keep inventories in balance with demand.
- How you can achieve the Ideal Turnover Rate for your business.
- What records will enable you to analyze trends in demand.
- What are the costly limitations of a single-card inventory record.
- What forms and procedures will save you up to 50% in operating time.
- How you can effectively *eliminate* writing of purchase requisitions.
- How you can save money with THE CHART THAT THINKS.

Answers to these—and many other vital questions on inventory control—are covered in this valuable free book. Every businessman can profit from reading "How To Get Profits From Inventories." Send for your copy today. USE THE COUPON.

Copyright 1948, by Remington Rand Inc.

Yes, thousands of businesses are successfully applying the principles of effective inventory control outlined in this unique book! And it's yours for the asking—Remington Rand's new, authoritative 24-page study "How To Get Profits From Inventories." It's packed with helpful facts, figures, charts that will show you how to attain a realistic picture of your inventory status... whether your position is safe or precarious... whether you're acting on facts or guesswork.

Today, more than ever, you need positive, accurate control over inventory... to prevent costly overstocks and to avoid shortages of fast-selling items. You can have such control—and this booklet tells how—with a simplified system that will cost you less for clerical upkeep than you're probably paying right now . . . and that will save time for you in your own day-to-day control of buying and selling. Act quickly—mail coupon today.

Remington Rand

THE FIRST NAME IN BUSINESS SYSTEMS

315 FOURTH AVENUE • NEW YORK 10, N. Y.

Yes—send FREE copy of your new 24-page book, "How To Get Profits From Inventories."

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

P-1

UP goes material-handling efficiency

when you use Battery Industrial Trucks

Greater efficiency in material handling means greater earning power in any plant. Start paring unnecessary moves for production hands or warehouse men and you not only reduce handling cost per unit, but make way for volume never before possible.

Battery industrial trucks are the dependable, economic means of obtaining such efficiency. They can perform their strenuous tasks 24 hours a day every day if required, and their power characteristics are outstanding: instant starting; quiet operation; no fumes; no power used during stops. Driven by electric motors, they have a minimum of wearing parts and are inherently trouble-free.

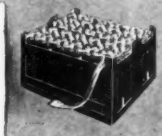
Keeping these hard-working trucks on the job calls for EDISON Nickel-Iron-Alkaline Batteries. Built of rugged steel, yet precise as a watch, they are recognized for dependability, long life and trouble-free operation. Specify EDISON and you specify maximum reliability—enduring quality.

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES



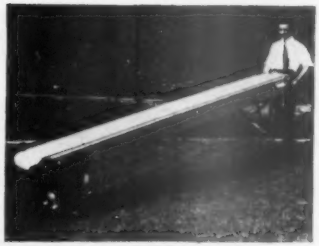
EDISON STORAGE BATTERY DIVISION

of Thomas A. Edison, Incorporated, West Orange, N. J.

In Canada: International Equipment Co., Ltd., Montreal and Toronto

where heavy burdens or exceptionally fast belt speeds make standard magnetic separators ineffective. Applications include protection of crushers, grinders, and other machinery, and removal of contaminating iron from various materials. Dings Magnetic Separator Co., 4740 West McGeogh Ave., Milwaukee.

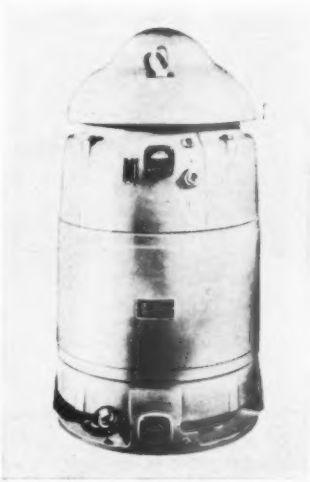
•



Portable Aluminum Conveyor

Light enough to be moved by one man, aluminum conveyor may be used individually to move packaged products or materials, or as a booster connection in a gravity conveyor system. Conveyor bed is reinforced with aluminum angles. Tie bars are underneath the bed. End plates are of 3/16-in. aluminum plate. Conveyor is powered by a ½-hp. 110-volt single-phase motor, with reversing drum switch, 15-ft. cord. Capacity of 11-ft. model on a 30-deg. angle is 20 tons per hour. Also available in 16- and 21-ft. lengths. Shingle & Gibb Co., 4621 Lancaster Ave., Philadelphia 31.

•



Pump Motor

Deep well vertical pump motor, called the Verticlosed Streamway, features an interchangeable base to permit increase or decrease in horsepower without the necessity of remachining or changing the pump head. It is constructed with a water-

BAD AIR IS COSTLY...

... as compared to the blower that keeps air fresh

Your men can't produce at top efficiency when stagnant, hot or fume-filled air robs them of their energy.

Wherever bad air slows down production . . . in shipholds, tanks, drums, boilers or other places where men need fresh, cool air . . . a Coppus Blower becomes both a safety device and a production tool.

Portable and easily adaptable for special purposes, Coppus "Blue Ribbon" Blowers and Exhausters fit all your "fresh air" requirements. The Coppus "Blue Ribbon" means premium performance at ordinary cost. Check and mail the coupon for specific information. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, BEST'S SAFETY DIRECTORY, MINING CATALOGS.

OTHER
COPPUS
"BLUE RIBBON"
PRODUCTS

HORIZONTAL TURBINE
Six frame sizes—
1 to 150 horsepower

VERTICAL TURBINE
Six frame sizes—
1 to 150 horsepower

FANMIX GAS BURNER

FANMIX OIL BURNER

MAIL THIS COUPON To Coppus Engineering Corp., 101 Park Avenue, Worcester 2, Mass.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets; etc., after-treated with coating material.

(Write here any special ventilating problem you may have.)

NAME .....

COMPANY .....

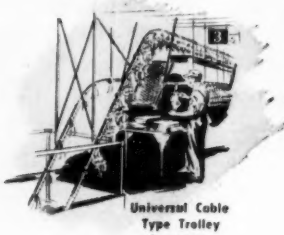
ADDRESS .....

CITY .....

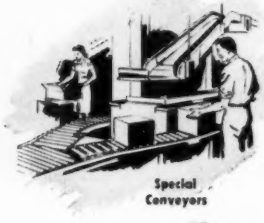
Buschman Conveyors

...get a big hand in any handling show

"Roll-or-Wheel" Portable Conveyors



Universal Cable Type Trolley Conveyors



Special Conveyors

"Beltevator" floor-to-floor Conveyor

For the newest and best in transporting materials Buschman Conveyors get an enthusiastic reception from materials handling experts.

Efficient Handling Reduces Costs. Whatever your needs, for receiving, manufacturing, assembly and shipping, there's a Buschman Conveyor to do the job.

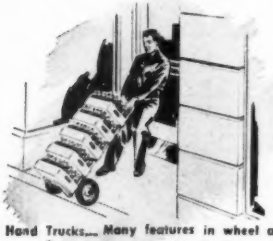
For that "tough" conveyor problem, let Buschman Engineers take over. They'll show you — at no obligation — how Buschman low-cost Conveyors fill your needs.

For complete details write for Catalog No. 300.

See 'em at the Show

The E. W. Buschman Co., Inc.
4425 Clifton Ave.
Cincinnati 32, Ohio

Buschman Conveyors



Hand Trucks... Many features in wheel and frame combinations.

proof housing to protect vital parts from weather conditions. Downdraft ventilation is said to prevent reentry of expelled hot air by blasting the air for approximately 5 diameters away from the motor. Flush-style oil gages have lucite windows for full visibility of oil supply. Standard models include a reverse protection clutch; non-reversing locking device can be provided on order. Other features include asbestos protection of windings, normalized castings to prevent inaccuracies or undue stresses upon bearings, and solid cast aluminum rotor. U. S. Electrical Motors, Inc., 200 East Slauson Ave., Los Angeles 54.

•

Electric Chisel Mortiser

Portable electric chisel mortiser adjusts to various sizes of mortise, serves as both a bench drill and a hand drill, and, when used with a bench clamp stand, may be used as a bench grinder. With auxiliary handle and 8-in. buffing head, it becomes a polishing tool. Steel drilling capacity is 5/16-in. diameter. Speed on full load is 800 r.p.m., with 110-120-volt universal motor. Fred L. Stuart, 33 West 42nd St., New York 18.

•

Colored Work Gloves

Line of heavy knit jersey gloves, in nine colors, black, and white, has been announced. Different colors may be used to indicate various divisions and job classifications, states the maker, or red gloves used to remind the operator of hazards involved in specific operations. Riegel Textile Corp., 342 Madison Ave., New York 17.

•

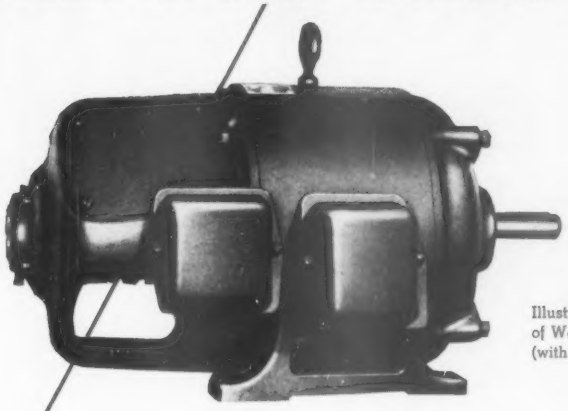
Turbine-Type Pump

Called the Monobilt, turbine-type pumping unit combines motor and pump in one assembly. Its capacity is 2 to 10 g.p.m. Heads and impellers are replaceable, providing means for

Century

WOUND ROTOR MACHINES

Are Available for *MANY* Industrial Uses . . .



Illustrating Century Line of Wound Rotor Machines (with covers).

For *Compressors • Cranes • Hoists • Bending Rolls • Refrigerators • Bridges • Synchro-Speed Drives • Printing Presses • High Frequency Current*

Century Polyphase Wound Rotor machines are adaptable to many applications that require

1. Adjustable varying speeds or reversing direction of rotation — such as bending rolls, fans and blowers, newspaper printing presses, etc.
2. Synchro-speed, multiple drives to be used when two or more industrial operations must be synchronized.
3. Converters — to supply high frequency current for high speed electric motor-driven machines and hand tools.
4. High starting torque with low starting current — for such applications as cranes, hoists, lift bridges, turn tables and car dumps.

Century Electric Wound Rotor Machines are built in sizes up to 400 horsepower and are available in open protected or splash proof frames.

Century builds a complete line of electric motors in a wide range of types and kinds, in sizes from 1/6 to 400 horsepower.

Century C MOTORS

Specify Century motors for all your electric power requirements.

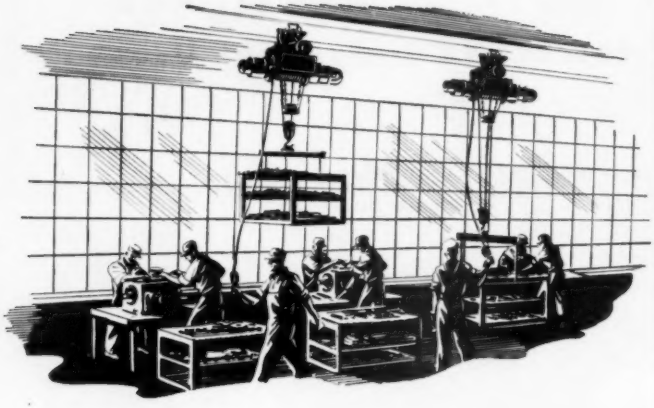
Popular types and ratings are available from factory and branch office stocks.

CENTURY ELECTRIC COMPANY • 1806 Pine St. • St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

CE-603

BREAK ASSEMBLY LINE BOTTLENECKS BEFORE THEY FORM



Be sure there is enough lift power and speed to feed parts or sub-assemblies to the main line at the correct tempo.

Will your need be for overhead cranes? What capacity? Or hoists? How large? How operated? From cabs—or from the floor with pendant controls?

The man best qualified to help you answer these queries is the Shepard Niles specialist. He has reference data to cover the performance of all three—and his mind is unprejudiced because he has sold all three for years. Let him help you plan!

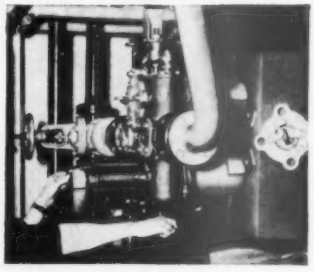
SHEPARD NILES
CRANE AND HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

364 SCHUYLER • MONTOUR FALLS, N. Y.

changing capacities if required, and facilitating repairs, according to the manufacturer. Unit is available in bronze-fitted, all-iron, and all-bronze models, equipped with a single-phase, 110-220 volt, 60-cycle capacitor-type motor, with ball-bearing construction and stainless steel shaft. All motors except the ¼-hp. model are dual voltage; the ¼-hp. is 110 volt only. Roy E. Roth Co., Rock Island, Ill.

•



Pipeline Strainer

Disk-type duplex strainer, designed to handle fluids with a high solid content without interrupting pipeline operation to clean the strainer, is said to be suitable for intermittent as well as continuous flow. A large handwheel diverts flow from one straining chamber to another. Covers are removable for lifting out the perforated strainer baskets. Manufacturer claims that the device is adapted to high open-area ratio and is suitable for a wide range of pressures and temperatures. Available in bronze, steel, semi-steel, and cast iron, with strainer baskets to specification in perforated brass, monel, or other metals, depending upon conditions. Mesh or magnetic types are also available on order. Dept. Z-5. J. A. Zurn Mfg. Co., Erie, Pa.

•

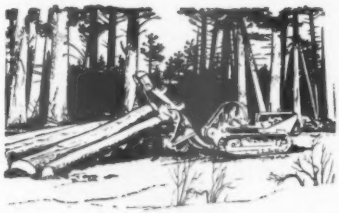
Portable Power Saw And File

Called the E-Z Saw, portable power saw and file is a heavy-duty unit that attaches directly to electric or air drills, or flexible shaft for power. It converts the rotary action of the power unit to a reciprocating motion. Suitable for panel, notching, and slotting operations, it can be converted to a power file by inserting machine file in place of cutting blade. Saw tooth arrangement is said to eliminate gummed teeth when sawing plastics. Adjustable handle, which can be locked in any position, permits use in close quarters. Device may be obtained with electric or air drill, or without the drill for attachment to present equipment. Anchor Mfg. Co., Inc., 2533 East 73rd St., Chicago 49.

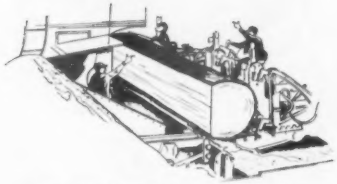
•

Ceiling Fixture

Called Cell-Cell, prefabricated, louvered, all-steel lighting fixture with baked-enamel finish is made up in honeycombed panels that fit together



Hines service starts with the harvesting of lumber in the forest itself where we employ expert personnel and the last word in labor-saving machinery.



The manufacture of quality lumber starts with the log and ends with a wood part engineered to fit your needs perfectly—a true forest-to-you service!

ON YOUR WOOD PARTS PRODUCTION COSTS

Wood is more versatile, wood is more economical, and wood is better for certain uses—that is the right kind of wood, properly selected and properly engineered. Hines engineers not only know the proper species of lumber to employ, but are expert in design and mass production of better wood parts at lower costs. These men are at your service—as well as Hines superb lumber manufacturing and harvesting facilities—a forest-to-you combination which has cut costs for many manufacturers, both large and small. A letter from you outlining your problems may result in savings of many thousands of dollars for your company. Write today!

EDWARD HINES LUMBER CO.

ENGINEERED FABRICATION DIVISION

2431 So. Wolcott Ave., Chicago 8, Ill.

HERE'S THE ONE

all-purpose quality enamel

FOR YOU...

KEM LUSTRAL 42

No need to carry a large inventory of finishes—when *one* enamel will do so many jobs so well!

Put Kem Lustral 42 on practically any kind of surface. Use it for product finishing—or for exterior or interior plant maintenance. Apply it by brushing, dipping or spraying. Bake it if you prefer, or simply air dry it. In every case, Kem Lustral 42 levels perfectly, hides beautifully, dries to a tile-like finish.

Pick just the color you want from a line of 21—plus black, gloss white and semi-gloss white. And get the Kem Lustral 42 you want quickly and conveniently—from any one of the 385 Sherwin-Williams branches located in principal cities from coast to coast. The Sherwin-Williams Co., Industrial Division, Cleveland 1, Ohio. (Export Division, Newark, New Jersey.)

Another Product of Sherwin-Williams Industrial Research

Can be Brushed! Dipped! Sprayed!

For Industrial Interior or Exterior Use!

Can be Air-dried or Baked!

21 colors plus Black, Gloss White and Semi-Gloss White!

AVAILABLE AT 385 SHERWIN-WILLIAMS BRANCHES!

SHERWIN-WILLIAMS INDUSTRIAL FINISHES

into a single continuous ceiling when hung below existing lighting fixtures. Manufacturer states that it eliminates glare below an angle of 45 degrees and delivers diffused, even illumination when used with either incandescent or fluorescent lighting. It may be used to conceal ceiling pipes, sprinkler systems, and air ducts without impairing their effectiveness. Used with overhead air-conditioning inlets, it is said to aid in diffusing the air stream. Panels come in 24- or 30-in. widths, in lengths varying by 6-in. steps from 12 to 96 inches, and weigh 12 ounces per square foot. Federal Electric Co., Inc., 8700 So. State St., Chicago 19

•

All-Metal Small-Parts Cabinet

Steel cabinet with aluminum drawers for storage of nails, screws, and other small parts is available in 32- and 64-drawer units. The 32-drawer unit is 6 inches deep, 12¾ inches wide, and 15¼ inches high. The 64-drawer unit is the same depth and height, but is 25½ inches wide. Drawers, 1¼x2¾x6 inches over-all, move on metal flange guides. Kaytee Products, Canton, Ohio.

•

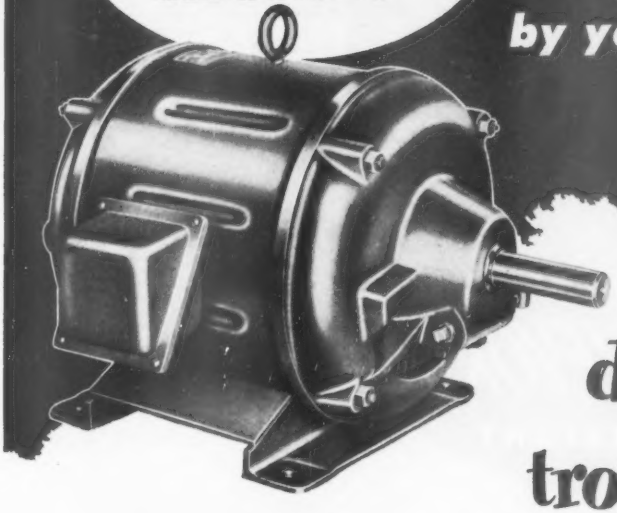
Small Multitester

Instrument, called the Miniature Multitester, is a combination ohmmeter and voltmeter for testing both alternating and direct current voltages. As an ohmmeter, the device indicates resistances from 0 to 2 million ohms, with an accuracy said to be within ± 2 per cent of linear scale. In testing voltages, it regis-

Wagner STEEL-FRAME Motors

Proved

by years of service!



quiet... dependable... trouble-free!

Since 1930, when Wagner started manufacturing steel-frame drip-proof motors, they have been *proved*—by years of hard usage in industry after industry.

Today this time-tested design is available in polyphase motors through 326 frame size. The motor frames are formed of heavy rolled steel, shaped to accurately center the stator core and to provide passages for adequate ventilation. An auxiliary fan draws in air through the openings in the front endplate, forces it through these passages and out through the endplate openings on the drive end. Heat is effectively carried off from all parts of the motor.

These motors are available with either sleeve or ball bearings. They are completely drip-proof when mounted in the normal horizontal position, and by rotating the endplates are still drip-proof in the sidewall or ceiling horizontal positions.

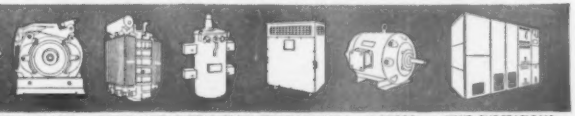
Bulletins give full information on the complete line of Wagner Motors. Twenty-nine branches, located in principal cities, are ready to assist you whenever you have a motor problem. In addition, almost 500 authorized motor repair shops provide speedy, nationwide service facilities.

Wagner Electric Corporation

6412 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.

Wagner Electric Corporation EST. WE 1891

Consult Wagner Engineers on all Electric Motor Problems



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

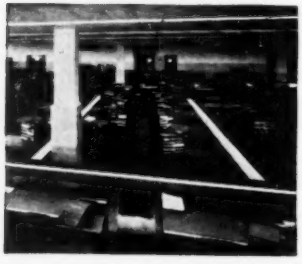
M49-2

HERE'S WHERE

OLSON CONVEYORS

PAY THE FREIGHT

•Interior freight...material handling...counts heavily in distribution costs. That's why Hibbard, Spencer, Bartlett & Co. turned to Olson. It's a complete Olson system that handles all interior freight and keeps costs down in this new wholesale warehouse.



Above, Olson slat and roller conveyors carry orders from packing to shipping. Left, the Olson system has been put to profitable use in the office too! There it handles order and billing correspondence.

Olson conveyors include *all* types necessary to cut material handling costs in *any* business or industry. Why not find out how Olson equipment . . . gravity or power, vertical or horizontal, permanent or portable . . . can cut *your* costs of handling any kind of bulk or packaged material. Write today!

SAMUEL OLSON MFG. CO., INC.

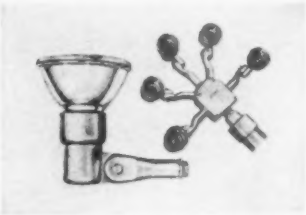
2424 Bloomingdale Ave. Chicago 47, Illinois

ELEVATING CONVEYING SYSTEMS

ters d.c. voltage from 0 to 300, with a claimed accuracy of ± 2 per cent at 10,000 ohms per volt. A.c. voltage, registering from 0 to 10,000 ohms per volt, is stated to be accurate to within ± 5 per cent.

Readings are indicated on a single, 2-scale dial, mounted in the front of the case, which measures approximately 4¼x3x1½ inches. Two small dry batteries, which power the meter action, are enclosed in the base of the case, and are accessible for replacement. Two test leads terminating in pin plugs and clip leads are provided, and when not in use, fit into a leather carrying case furnished with the instrument. International Instruments, Inc., 311 East Street, New Haven 11, Conn.

•



Lamp Holders

Line of cast-aluminum lighting fixtures for PAR-38 and R-40 lamps consists of three basic units: a lamp holder, an adapter box for a cluster of up to 5 holder units, and a pole slip-fitter for use in either 1½- or 2-in. pipe. Accessories consist of wall and outlet box fittings, a housing to eliminate spill light, baffle-louvers, and color equipment. Adjustment is provided by an articulated joint. Mounting nipple is threaded ½ inch for use with standard electrical equipment, and threaded neck makes possible the attachment of flood-light reflectors. Steber Mfg. Co., Broadview, Maywood, Ill.

•

Tube Fitting

Designed to meet new standards set for hydraulic circuit connections on production machinery, tube fittings, called Triple-lok, have solderless steel circuit couplings and dryseal pipe threads. They have a 37-deg. flare angle and black nuts and sleeves with cadmium-plated body. Fitting is said to accommodate the complete range of tubing wall thicknesses. The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12.

•

Mercury-Type Relays

Suitable for the switching of heavy loads, including highly inductive circuits such as solenoids and motors, line of hydrogen arc-quenched mercury-type relays operates on the double-flow principle. Contacts are between two pools of mercury, in the presence of hydrogen gas under high pressure. Heat and corrosion, manufacturer states, are virtually eliminated by this combination. Four types of action are available with normally open or normally closed

Your Material Handling is Easy

WITH PITTSBURGH COLLAPSIBLE CARGOTAINERS

From Production Line

The Cargotainer receives parts as they come from machines. Empty Cargotainers are collapsed, take little space, are light-weight, can be kept handy.

To Storage and Shipping

Fork truck takes filled Cargotainer from production to storage, then loads Cargotainer from storage to truck or freight car. There is no re-handling of parts.

To Assembly

Cargotainers are received and stacked ready for assembly line. Inventory is easy—stock always visible. Fork truck delivers to assembly points.

Write today for free illustrated booklet to Pittsburgh Steel Products Company, 3257 Grant Building, Pittsburgh 30, Pa.

Visit us at the Modern Materials Handling Show—Booth 511, Convention Hall, Philadelphia.

Pittsburgh Collapsible Cargotainer

Pittsburgh Steel Products Company
Subsidiary of
Pittsburgh Steel Company

CHESTER HOISTS

for Lower Costs

CHESTER SPUR GEARED CHAIN HOISTS, made by the Hoist Division of The National Screw & Mfg. Co., are expertly designed and built to give you rapid lifting and lowering with utmost economy. They are strong, safe and dependable.

Timken Bearings reduce friction on all working parts and insure smooth operation and long life. A retaining brake holds the load at any position.

In sizes from ¼ ton to 40 tons, this complete line of cost-saving hoists is furnished in many adaptations, such as Extended Hand Wheel, Twin Hook and close headroom types such as Army, Clevis Connected, etc.

CHESTER DIFFERENTIAL HOISTS are designed for use where occasional lifting is required at a minimum expense. Made in ¼, ½, 1 and 1½-ton sizes, these lower priced hoists are light and portable, hold their load at any point and will not self-lower.

CHESTER TROLLEYS are furnished in either plain or geared types, with either Timken Roller or plain bearings. They are well balanced and give excellent service.

Send Coupon or Write for Full Information

THE NATIONAL SCREW & MFG. CO.

Chester Hoist Division • Lisbon, Ohio

The National Screw & Mfg. Co., Chester Hoist Div., Lisbon, Ohio

Please send information on _____

Name _____

Company _____

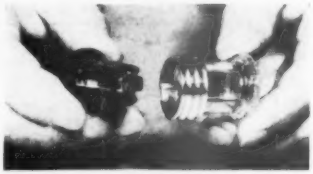
Address _____

F. 1-9

contacts: (1) quick-operate, quick-release; (2) quick-operate, slow-release; (3) slow-operate, slow-release; and (4) slow-operate, quick-release. Time delays are available to specifications from 0.15 to 20 seconds.

Relays are made in single or multiple units. Single units are furnished in 30- or 60-amp. capacity. Standard models have moisture-proof bakelite insulating shells; the end bead may be rubber covered to make the relay waterproof. Durakool, Inc., Elkhart, Indiana.

•



5-in-1 Plug Fuse

Selection of new links in 15-amp. 5-in-1 plug fuse is made possible by rotating glass shell, which houses a bronze contact spring that provides snap action, and serves as both ratchet and contact. The five fuse links are held in their individual receptacles in the inner unit by a plastic material which, according to the manufacturer, will not chip, crack, or warp. H-R Electric Co., Dearborn, Mich.

•

Low-Lift Pallet Truck

Hydraulic low-lift 2000-lb.-capacity pallet truck, called Jack-O-Might, is provided with metered valve control. Front wheels swivel full 360 degrees for maneuverability, and the design of the skate is said to provide smooth pallet entrance. Handling Devices Co., Inc., 581 Boylston St., Boston.

•

Timer Control

For automatic timing of continuous processing work where the various process periods bear a percentage relationship to the total time cycle, device, called the DB process timer, measures 14x12½x8 inches. Manufacturer states that an entire process combining many operations can be set up on the single dial, and that adjustments of both the total time cycle and the timing of individual periods can be made.

Device consists of a synchronous motor operating through an adjustable drive to move a control arm

It has taken up the slack on power transmission costs

Du Pont "Cordura" High Tenacity Rayon

For high strength at low cost ... look into Cordura*

Engineers have virtually eliminated the "stretch" in V-belts by using cord made of Du Pont "Cordura." That means more power from each belt ... fewer take-ups ... less maintenance. V-belts also last much longer when they're made with this high tenacity rayon!

"Cordura" is engineered to give far greater inherent strength than natural fiber yarns commonly used. And each strand of this man-made yarn is a continuous filament—no short pieces to pull apart under strain.

Perhaps you'd expect to pay a premium for such advantages. Yet manufacturers can often use "Cordura" to reduce production costs. That's because you get so much strength from so little—and because "Cordura" is reasonably priced.

Can you use "Cordura" to improve an article you make? Write Du Pont for detailed information about "Cordura" High Tenacity Rayon. And tell us your specific needs. Perhaps we can help guide you to a profitable application.

Can you use a product improved with "Cordura"? Check with your supplier—or write Du Pont.

Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING ... *THROUGH CHEMISTRY*

for RAYON ... for NYLON ...
for FIBERS to come ... look to DU PONT

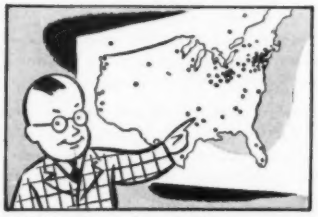
"It's QUALITY CONTROL that sold me on Boston Gears!"

"67 years of experience give Boston Gear Works a big edge in know-how and craftsmanship. They've worked out processes and techniques that build *extra* quality into their products."

"Everything is checked and tested. Boston Gear controls its own materials and alloys . . . uses only virgin metals . . . tests its materials for hardness and tensile strength . . . tests its products for shock strength, hardness and wear."

"Every craftsman is an Inspector . . . makes sure previous operation is properly done before he starts . . . inspects his entire run and he's double checked by our elaborate Central Testing Lab."

"Engineers can design around Boston Gear stock parts with complete assurance of success . . . manufacturers can cut costs *safely* with these mass production masterpieces. Rigid inspection of all production for exacting tolerances and size of finished products is your guarantee of perfect interchangeability."

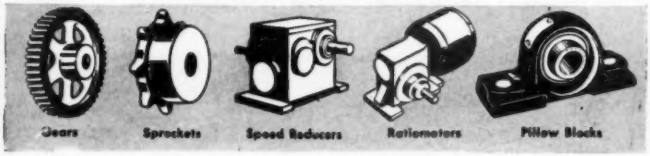


"And Boston Gear products are sold coast to coast through 71 DISTRIBUTORS. There's one within fast shipping time of *your* plant . . . and you can now buy most Boston Gear products *right off the shelf!* See our THOMAS' REGISTER insert under Gears & Pinions for your nearest source . . . or write for list of Authorized Distributors.

One of the world's most complete lines . . . 71 Distributors in major cities

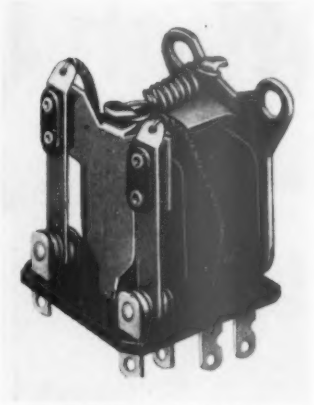
BOSTON GEAR WORKS

70 Hayward St., Quincy 71, Mass.



radially around a calibrated scale, resulting in a stepless and wide-speed range. Speed range is in the ratio of 36 to 1. Individually adjustable stationary contacts are located around the periphery of the dial; moving arm makes and breaks contact with each in succession. Unit is adaptable for timing either continuously repeating, single cycle, or so-called interrupted cycle processes. Struthers-Dunn, Inc., 150 North 13th St., Philadelphia 7.

•



Small Magnetic Relays

Designed for automatic and remote control circuit applications where space is extremely limited, magnetic relay, measuring 1⅛x1⅝x1 inches, has a metal base and solder-type terminals. Suitable for operation on 115-volt 60-cycle alternating or 32-volt direct current. Supplied with d.p.d.t. silver contacts rated at 3 amperes, 115 volts, 60 cycles maximum for non-inductive loads. Ward Leonard Electric Co., Mt. Vernon, N. Y.

•

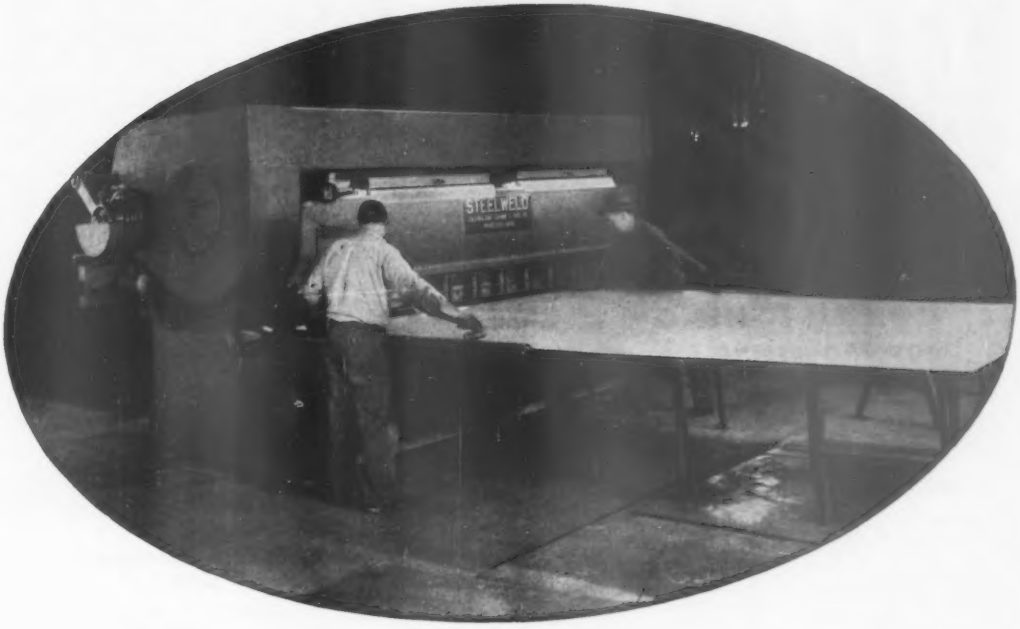
Air-Line Joint

For use in directing or maintaining a jet of liquid or air to a specific point, air-line joint, made of aluminum, weighs 3½ ounces, swivels 360 degrees. Manufacturer states that once installed, adjustment is unnecessary, and that machine vibration will not disturb its position. Suitable for use with either liquid coolants or compressed air. Universal Air-Line Joint Mfg. Co., Lafayette, Ind.

•

Electric Water-Heater Units

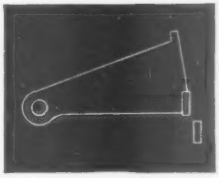
Built in capacities from 600 to 5000 watts, electric water-heater units are



PIVOTED-BLADE MAKES SHEARING

Fast . . Easy . . Accurate

Because of the pivoted-blade design, Steelweld Shears have several outstanding advantages heretofore unavailable in any shears at any price, which make shearing fast, easy, accurate:



EASY KNIFE ADJUSTMENT

A direct result of this design is the easy knife adjustment it makes possible. Knife clearance is quickly made to suit every plate thickness by simply turning a crank until pointer in an indicator is set for the metal to be cut. No bolts to loosen; no parts to move.

ELECTRIC FOOT CONTROL

The pivoted-blade design made the application of electric foot control a "natural." In fact it costs no more than the old-fashioned fatiguing mechanical foot treadle. For this reason it has been adopted as standard on all Steelweld Shears.

ALL-WELDED ONE-PIECE FRAME

Only because of the pivoted-blade design, was it possible to weld all parts of the frame into one solid integral unit. As there is no need of moving the bed to adjust for knife clearance, it, too, is welded permanently to the end housings. Since there are no bolted connections to loosen and misalign, deflections are minimized and long-time accuracy assured.

MANY MORE IMPORTANT FEATURES

These are a few of the features. There are many more. When you get the facts you will agree that no other shears compare with Steelwelds.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

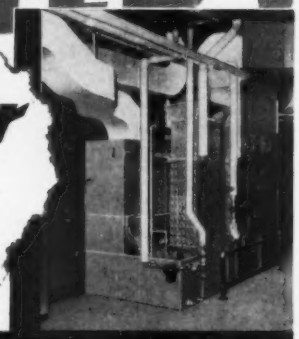
THE CLEVELAND CRANE & ENGINEERING CO.

3213 EAST 282nd ST. *WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE **SHEARS**

PROVED!

Kathabar HUMIDITY CONDITIONING FOR PROCESSING AND COMFORT



IN LEADING INDUSTRIES

A PARTIAL LIST OF KATHABAR APPLICATIONS

CHEMICAL
Photographic Film Processing and Storage
Match Drying • Stencil Drying
Sensitized Paper Mfgr
Drug & Pharmaceutical Mfgr
Gelatin Capsule Processing
Glue Drying • Shellac Drying
Chemical Processing
Processing of Sodium
Vitamin Mfgr
Gunpowder Processing
Processing Plastics
Rocket Powder Processing

MANUFACTURING
General • Ceramics Drying
Storage of Highly Finished Metal Parts (Corrosion Preventing)
Compressed Air Drying
Covered Cable Drying

METALS INDUSTRY
Powdered Metals Processing
Cupola Dry Blast (Foundry)
Safety Glass Manufacturing
Magnesium Castings Production
Aluminumizing Process

FOOD
Drying of Icings—Bakery
Candy Making • Fish Drying
Bean Sprout Cultivation
Vegetable Dehydration
Processing Powdered Coffee
Cranberry Dehydration
Milk Drying
Spaghetti Mfgr.

LEATHER
Shoe Drying

PRINTING AND PAPER
Cellophane Printing
Color Lithography & Printing
Paper Making

TEXTILE
Rayon Storage
Nylon Hosiery Knitting

MISCELLANEOUS
Cargo Ship Dehumidification

LABORATORIES & TEST ROOMS
Paper Testing • Metals Laboratory
Rubber Testing Laboratory
University Laboratory

COMFORT AIR CONDITIONING
Auditoriums • Hospital Rooms
Department Stores • Hotels
Restaurants • Cafeterias
Drafting Rooms • Office Buildings
Banks • Dental Laboratories

● In 1942, a leading midwestern pharmaceutical manufacturer installed the first Kathabar Humidity Control System in its plant. Since that time 19 additional units have been placed in operation in this plant on individual product production lines and five more units are on order to be installed. Some of these systems maintain atmospheres of less than 10 percent relative humidity at 80°F. Others at higher humidity conditions.

A pilot installation for humidity control in the plant of a leading match manufacturer proved Kathabar's superior operation over existing mechanical cooling methods by producing more consistent conditions, simplifying the operation, and reducing greatly the initial maintenance and operating costs. Their first permanent Kathabar installation was made in early 1947 and plans are now underway for complete replacement of the balance of obsolete equipment of previous methods.

These are *only two* examples where leading processing industries have benefited greatly by installing Kathabar Systems. Today there are over 300 installations in operation. Many of these units represent repeat orders. Why? Because *Kathabar Systems do control humidity—produce the desired results and reduce costs.*

GET THE FACTS • Ask a Kathabar Humidity Engineer to tell you about Humidity Conditioning. Let him present proof of Kathabar reliability and dependability. Get the facts first-hand!

RETURN THIS COUPON

☐ Send booklets on Industrial and Comfort Humidity Conditioning

☐ Have Kathabar Humidity Engineer call. No obligation

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

SURFACE COMBUSTION CORPORATION • TOLEDO, OHIO

said to be sealed at all terminal points against moisture penetration, to prevent short circuits. Units are made with single, double, and triple loops, depending upon wattage required. In all cases, the tubing is copper; the insulator block, glazed steatite; the flange forged brass. A nickel and chromium alloy is used for the heating coil, which is centered in the sheath and insulated with magnesium oxide. Units are built for three voltage ranges: 115 to 120, 208, and 230 to 240. The Yale & Towne Mfg. Co., 2933 Main St., Buffalo, N. Y.

●

Automatic Emergency Lighting Unit

Called the Big Beam Model 2-ADS, emergency lighting unit plugs into any standard outlet. It switches on automatically, states manufacturer, whenever regular lighting current fails or is interrupted. Features include two independent floodlight heads, 5 inches in diameter; brass, friction-type corrosion-proof swivel joints which hold adjustable heads in any horizontal or vertical position, and an 8-ft. rubber covered cord and plug. Unit operates on one 9-volt standard dry battery; the container is of 20-gage steel, designed with full-length piano hinge and two lever-type latches for cover. Weight, with battery, is about 18 pounds. U-C Lite Mfg. Co., 1050 West Hubbard St., Chicago 22.

●

Fire Detector

Electronic fire detector, designed to indicate overheating within an area of 625 square feet, signals warning of a fire on a central board and specifies its exact location. Central board is also signaled if any part of the system is not functioning, or if fire potentialities, such as short circuits, exist. When installed in a large building, manufacturer says the main control unit will indicate the floor on which there is a fire, and another unit on that floor will specify the exact position. Lord-Taber, Inc., Canandaigua, N. Y.

●

Paint

Said to serve as a sealer, undercoater, and flat finish in one application, oil-base paint, called Hidex, is suitable for use on wood, metal, or masonry. It is quick-drying, can be applied by brush, spray, or roller, does not show brush marks, and is said

A Big Step Forward!

ALL-METAL
CHROMALOX
Electric
RADIANT HEATERS

A New Infrared Heat Source

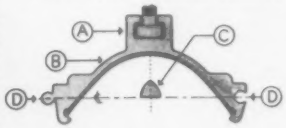
Now—You can use infrared heat in many applications where it has not been entirely practical before. That's because the new, all-metal CHROMALOX Radiant Heaters withstand shock, vibration, dust and moisture . . . they provide glareless infrared radiation in wave lengths which are absorbed almost equally well by all colors, textures and surfaces . . . they operate efficiently in high and low ambient temperatures.

FLEXIBLE IN APPLICATION—CHROMALOX Radiant Heaters are used for infrared drying, preheating, baking, curing, mass-heating, skin-drying, dehydrating and similar applications. Tongued-and-grooved sides facilitate fabrication of heater sections into various working patterns such as banks, tunnels, ovens, etc.

HIGH IN EFFICIENCY—The heat source is an efficient Inconel-sheathed CHROMALOX Tubular element which operates at temperatures of 1000° to 1400° F. It produces uniform and even heat without hot-spots and with a negligible amount of incandescent light. "Alzaked" aluminum reflector sheet gives maximum radiation.

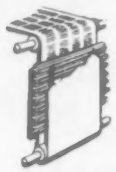
GLASSLESS, ALL-METAL CONSTRUCTION—Extruded aluminum body and shock-proof heating element withstand rough usage; dangers of glass breakage are eliminated. Compact size —4" depth with lengths of 25", 31" and 47". Units come complete with adjustable mounting bolts, ready to install.

QUICK, LOW COST INSTALLATION
EFFICIENT, DEPENDABLE SERVICE

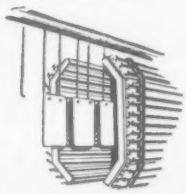


A. Two adjustable captive-bolts per section permit quick and easy mounting into desired position.
B. Extruded aluminum body is equipped with a highly polished, non-oxidizing parabolic reflector for maximum reflectivity.
C. Heat source is high temperature Chromalox triangular-shaped element located to give efficient direct and reflected radiation.
D. Units can be quickly interlocked lengthwise to form straight lines and circular or oval banks of any desired width.

TYPICAL APPLICATIONS:



Single-banks of Chromalox Heaters, mounted in line, bring the efficiency of infrared heat to applications where it was not practical heretofore because of space limitations.



Easily formed, double-banks of Chromalox Radiant Heaters are ideal for line-production. Infrared rays are radiated directly and uniformly on materials being processed.

Sections may be interlocked to form tunnels over conveyor belts; units operate with equal efficiency from all angles. Their glassless construction permits their use in processes and assembly lines which formerly avoided infrared heat because of the hazards of open flames or glass breakage and contamination.

CHROMALOX

Electric Heat for Modern Industry

EDWIN L. WIEGAND CO. 7518 THOMAS BLVD., PITTSBURGH 8, PA.

Write for Free Bulletin CS-603

It contains complete information and specifications on the all-metal Chromalox Electric Radiant Heaters and shows how you can use these units in your present or projected infrared applications.

Standardize on Sleeve Bearings AND SAVE MONEY!

■ The trend in manufacturing circles today is toward STANDARDIZATION—away from specials. This is particularly true of Bearings. The machine designer has a golden opportunity to combine economy with efficiency by utilizing Johnson G. P. Standard Stock Bearings . . . .

From our list of over 850 sizes, the designer can secure at least 90% of his requirements from stock without delay. Every bearing is precision finished to standard tolerances, ready for immediate installation. Large production runs provide a low unit cost and every bearing is cast from the highest quality bronze alloy available . . . .

Our new catalogue lists and describes the complete service available on Johnson G. P. (general purpose) Bearings. Write for your copy.

JOHNSON BRONZE CO.
512 South Mill Street — New Castle, Pa.

Specify JOHNSON GP GENERAL PURPOSE BEARINGS

JOHNSON BRONZE SLEEVE BEARING HEADQUARTERS

Branch Offices

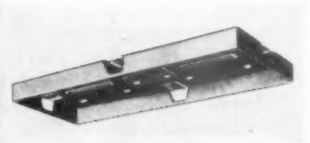
to be free from objectionable odors. Manufacturer states that it bridges and seals air checks and hot spots, making it suitable for use over previously painted surfaces. It is washable, and is available in six colors and white. The Watson-Standard Co., 225 Galveston Ave., Pittsburgh.

•

Collapsible Platform Truck

Called Fold-A-Truc, collapsible aluminum platform truck weighs 60 pounds and has a load rating of 1,200 pounds. Handle folds flat against the platform when the truck is not in use, permitting the truck to be set on end and stored in a space 10 inches deep. Its 24x40-in. heavy aluminum-plate platform, riveted throughout, is reinforced with a heavy aluminum angle running the length of the platform, and provided with two swivel and two rigid 5-in. double ball-bearing casters for maneuverability. Waprin Corp., 501 South Jefferson St., Chicago 7.

•



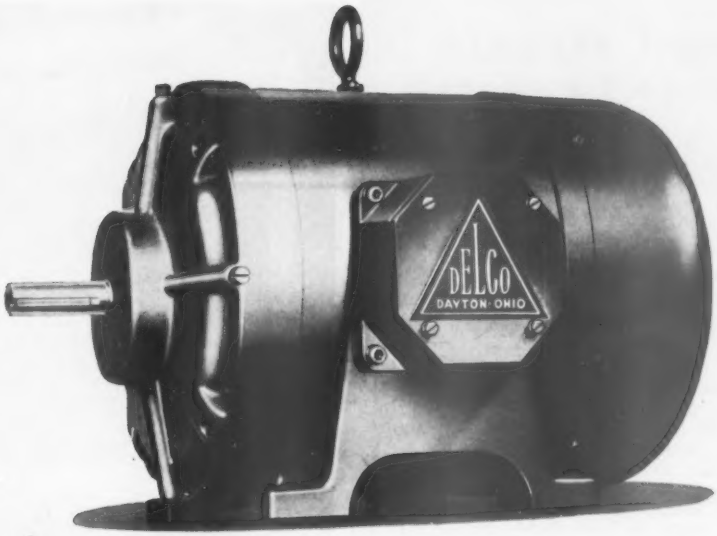
Grounding Box

Designed to serve as a ground for fluorescent fixtures, No. 5738F grounding box is designed for use with manufacturer's 500 and 700 raceways and is said to protect splices coming into contact with combustible materials. Box measures 8x3 1/8 x 7/8 inches, and has raised section with 1/2-in. knockout for no-bolt fixture stud. The Wiremold Co., Hartford 10, Conn.

•

Electrical Contacts

Made from copper-tungsten by the powder metallurgy process, electrical contacts, known as Gibsiloy UW6, are said to interrupt heavy currents with minimum erosion. For efficient operation, manufacturer recommends high contact force and a sliding, wiping action on opening and closing. Typical applications include air circuit breaker arcing tips and intermediate contacts, and oil circuit breaker arcing tips and current carrying contacts. Gibson Electric Co., 8362 Frankstown Ave., Pittsburgh 21.



NO *down-time* WHEN

DELCO MOTORS

ARE ON THE JOB!

Down-time for repairs costs money! For motors that won't let you down . . . always deliver under the most adverse conditions . . . specify Delco motors. They combine simplicity of design with rugged construction . . . require a minimum of maintenance.

Delco's special features assure continuous, trouble-free power: Locked bearings, Delcote coil insulation, corrosive-resistant cast iron frame, positive lubrication, dynamically balanced rotor and shaft assembly, watertight conduit box—features that mean you can depend on Delco for dependable power.

Eliminate down-time with Delco motors! There is a Delco motor built to fit your needs exactly.

Delco totally enclosed fan-cooled motors are produced in sizes ranging from fractional ratings to 75 h.p. (Continuous duty, constant speed, 60 cycle, polyphase.)

For complete data on Delco Motors, address Delco Products, Dayton, Ohio, or our nearest sales office.

DELCO MOTORS

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION

SALES OFFICES: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HARTFORD, CONN.

No. 3 in a series of performance case histories

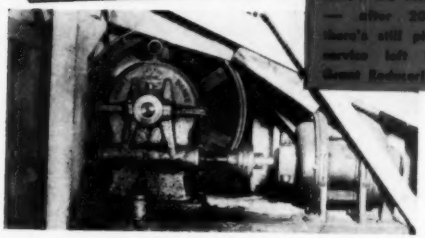
Grant REDUCER in use 20 years . . . NOT A PENNY SPENT ON MAINTENANCE

. . . H & P Spool and Bobbin Co., Lawrence, Mass., gives the details of another great performance story.

H & P SPOOL & BOBBIN COMPANY

LAWRENCE, MASSACHUSETTS

Early in 1928 we installed a Grant 5⅝" Model B Worm Gear Reduction Unit as the driving medium on a horizontal conveyor. This Unit gave a reduction in speed of 33 - 1, power being supplied by a 2 H.P., 1200 R.P.M. Motor directly connected to the reduction unit by a flexible coupling. This Unit has operated approximately thirty hours per week since installation, without attention or repair except for regular cleaning and lubrication. A good record for a good unit.


Here's the installation — after 20 years there's still plenty of service left in this Grant Reducer!

Performance stories like the one above don't "just happen". Grant Reducers perform years longer without maintenance because they are designed and built from the finest materials with utmost precision. All Grant Reducers are equipped with radial thrust ball bearings, oil seals, gears of high test bronze, worms of chrome vanadium steel and many others.

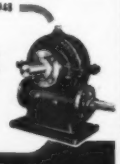
Grant Gear Works, Inc.,
165 West Second Street
So. Boston 27, Mass.

Decide now to cut maintenance costs in your plant — install Grant Reducers for long trouble-free service.

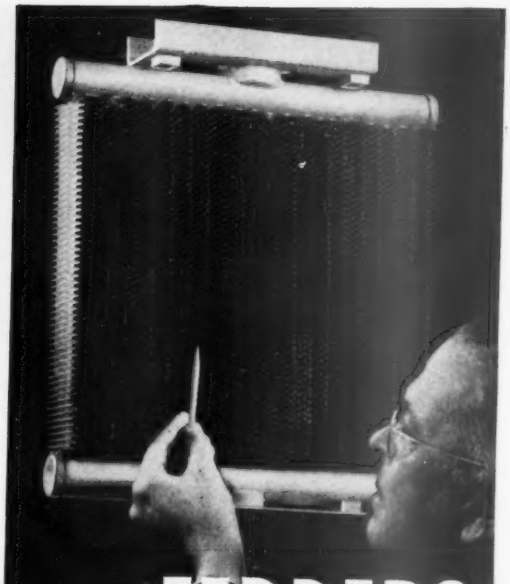
WRITE TODAY FOR FREE CATALOGUE

1877 – GEARED TO INDUSTRY'S NEEDS FOR 71 YEARS – 1948

Grant SPEED REDUCERS

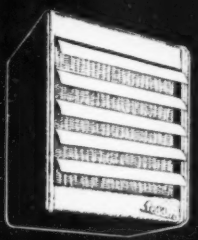


7 gear arrangements — hundreds of ratios



How FEDDERS UNIT HEATERS are Built to Give SERVICE

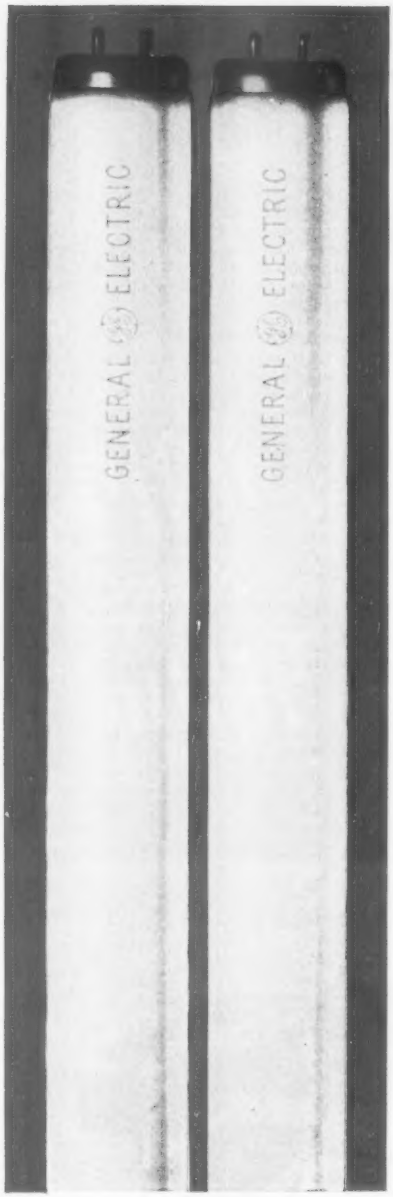
Write for catalog giving complete specifications



● Part by part, you can depend on Fedders advanced engineering. All copper heating element with streamlined tubes and patented saddle fins assure thermal and aerodynamic efficiency. Fins saddled over sides of tubes eliminate expansion stresses between fin and tube. Each tube is free to "give" laterally thus relieving differential expansion stresses between adjacent tubes. Fins are brazed to headers through die-formed flanged holes.

FEDDERS-QUIGAN CORPORATION

BUFFALO 7 NEW YORK



How to brighten a production picture!

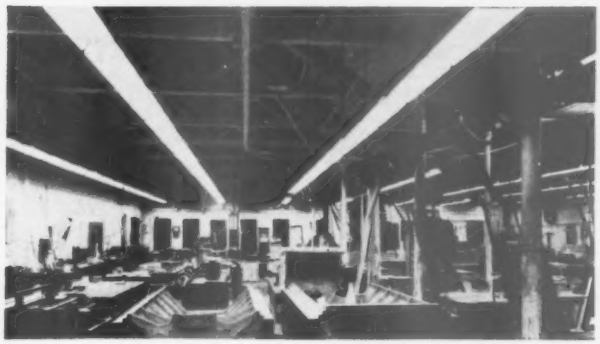
POOR LIGHTING robs you of production—cuts profits—reduces plant safety!

Now's the time to brighten up with new General Electric fluorescent lamps. Replace worn-out lamps that no longer give you all the light you pay for. Install additional fluorescent lighting where it is needed. Modernize lighting throughout your business!

Plenty of bright new G-E fluorescent lamps are now available to give you the better lighting you need to get increased production in both office and factory.

See your General Electric lamp supplier today. Always specify G-E fluorescent lamps for all replacements or new installations. You can always depend on General Electric to give you full value for your lighting dollar.

FREE BOOKLET. "PROVING GROUNDS FOR G-E LAMPS" tells facts about lamp quality of interest to every lamp buyer. Write General Electric, Division 166-F 149, Nela Park, Cleveland 12, Ohio.

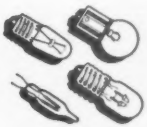


G-E LAMPS

GENERAL ELECTRIC

Whatever Lamps you need

FILAMENT
All types and wattages for every lighting need.



INDICATOR
Glow and filament types. For signal panels, etc.

SILVERED BOWL
Indirect lighting at low cost. 60 to 1000 watts.

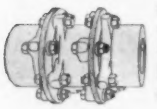
REFLECTOR
Spot and flood types. Self-contained reflector.

-G-E makes 'em all

THOMAS Flexible ALL-METAL COUPLINGS

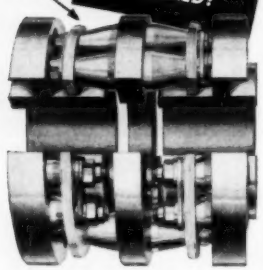
Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special coup'lings.



BACKLASH FRICTION WEAR and CROSS-PULL are eliminated NO LUBRICATION REQUIRED!

PATENTED FLEXIBLE DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

Write for New Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

YOU WANT TO KNOW

more about the items on this page

Letters to the addresses given will bring you further information.

BALANCES INVENTORIES. Booklet, 9 pages, "Inventory Control." Explains Wilson Inventory Management Plan, using device called Inventroler. System claimed to cut inventories one-third with no change in stockroom service, or, with present inventories, to improve service 70 per cent. Wilson Inventory Management Activities, Inc., 540 Ridgewood Rd., Maplewood, N. J.

SOUND DEVICE for analyzing, measuring industrial noises, vibrations, such as vibration of walls, machinery, similar problems. Portable seismograph. Size of ordinary box camera. Records from 600 to 15,000 cycles per minute, amplitudes from .0001 to 1/16 inch. Barry Corp., Cambridge, Mass., and Westinghouse Electric Corp., Baltimore.

LIQUID STAINLESS STEEL in fluid plastic base. For coating, finishing wood or metal objects. May be used on plywood sinks, showerstalls, furniture, similar applications. Applied by brushing, spraying. Water-, chemical-, corrosion-, and fireproof. Also available in basic colors with metallic sheen. Plastics Div., The Lockrey Co., College Point, N. Y.

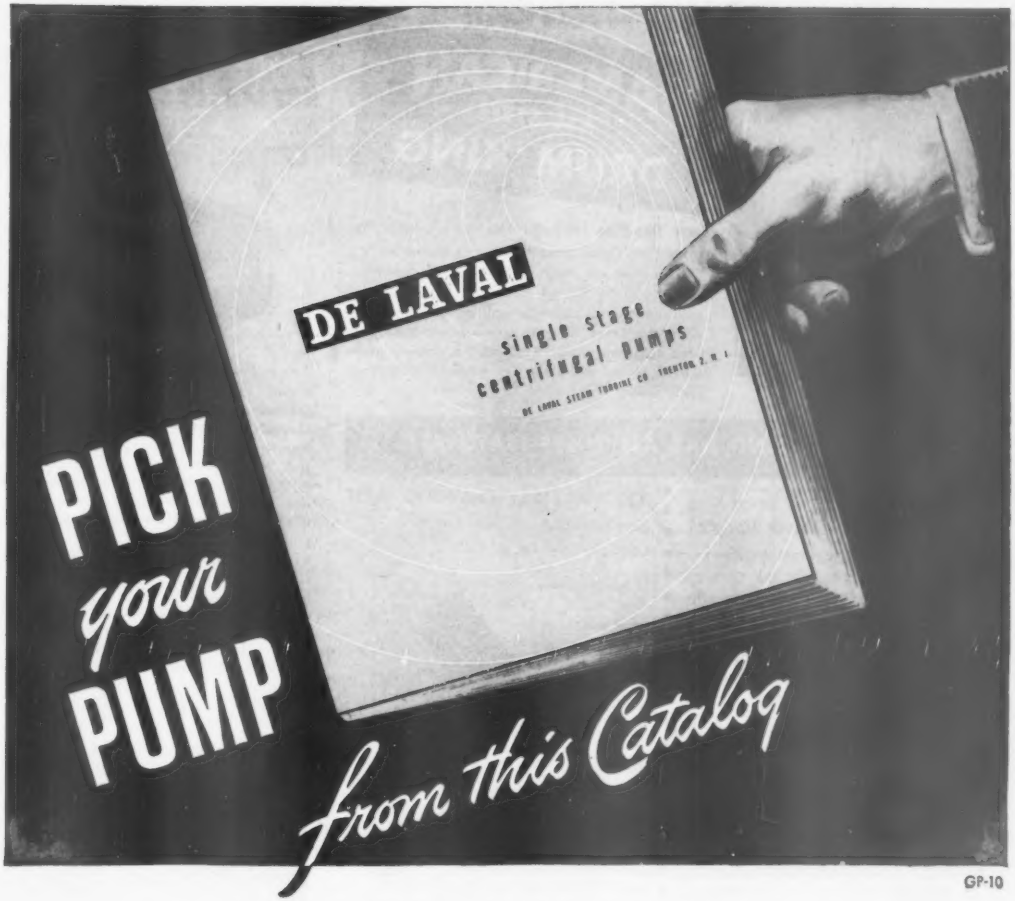
ROAD SANDER for individual truck installation. Deposits grit through non-freeze nozzles in front of driving wheels on ice or snow. Electrically operated solenoid valves, twin grit hoppers, installed on chassis. Regulated by dash-mounted push-button switch. Highway Safety Appliances, Inc., St. Paul, Minn.

PLASTIC DECALS. For labels, instructions, warnings, certifications. Suitable for application on baked synthetic enamels, wrinkle finishes, leather and leatherette, synthetic fabrics, etched and polished aluminum, chrome and nickel plate, stainless steel, plastic surfaces, sheetings. Said to have quality of cumulative adhesion; sets up bond within few hours, improves from week to week until finally permanently welded to surface. Christman Engraving Co., Battle Creek, Mich.

NYLON FILTER CLOTHS. Made to fit any rotary vacuum or pressure filter, filter press. Resistant to acids, alkalies, bacteria. Easy to clean. Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. J.

CONVERTS VIBRATIONS TO LIGHT, SOUND. Mechano-electronic triode transducer. Electron tube weighs 1/16 ounces, is smaller in diameter than cigarette, half as long. Used to detect defects, unbalance in

BUSINESS MACHINE STAND. All-welded joints. Minimum vibration. Rubber-mounted work trays under drawers. Standard typing height. Said to lessen fatigue. Meilink Steel Safe Co., Toledo.



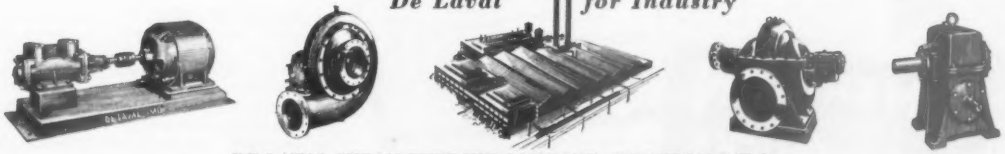
GP-10

COMPLETE WITH RATING TABLES AND DIMENSIONS

The text explains and illustrates features of design that you should look for when buying a pump. The simplified rating tables list pump and motor sizes for delivery and head requirements ranging from 150 gpm and 30′ head to 5000 gpm and 250′ head. The dimension drawings provide all information necessary for preliminary installation layouts. Ask for catalog GP-10.

DE LAVAL

De Laval for Industry



DE LAVAL STEAM TURBINE COMPANY • TRENTON 2, N.J.

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

NEW DRUM TRUCK!

AMERICAN ALL-STEEL DRUM KING

Easy One-Man Loading! The new *American* Drum King Truck makes drum and barrel loading and hauling an easy, safe, one-man operation. Drums can be loaded quickly and maneuvered with ease and complete safety. Use this new *American* Drum King to speed hauling and reduce operating costs. All-Steel construction keeps the truck on the job . . . keeps maintenance costs down.

ONLY DRUM KING HAS ALL THESE FEATURES!

1 GREATER SAFETY — Drum King Stands Upright!

Unique "floating axle" design permits the truck to stand in a safe, space-saving upright position *when not in use.* This feature eliminates the hazardous condition of drum trucks lying on the floor.

2 EASY TO LOAD — Roll Drum King Right Up To The Job!

No need to "jockey" or "inch" the truck into position. Wheels roll truck up to drum, fast and easily. Hook drops over chime of drum when released. As the load is broken, the nose prongs automatically slide under load and wheels automatically move into load-carrying position.

3 SAFE, FOUR-POINT LOAD SUSPENSION — Permits Hook To Be Disengaged After Truck Is Loaded!

Greater safety for both operator and truck is assured because, should the loaded truck strike an obstacle, the load is free to leave the truck without pulling operator and truck along with it.

4 LOADED TRUCK CAN STAND ALONE — Semi-Upright Position Keeps Load Ready To Move!

Hinged wheels permit the loaded truck to stand in semi-upright position.

5 TRUCK ROLLS EASILY — Drum King Reduces Operator Fatigue--Speeds Hauling!

Full weight of load is carried over strong pressed-steel rubber-tread wheels. Operator easily balances load — does not carry it.

Mail This Coupon Today!

Please send me your new American Hand Truck Bulletin HTB48 featuring the complete line of American Pressed-Steel Hand Trucks.

NAME_____

COMPANY_____

ADDRESS_____

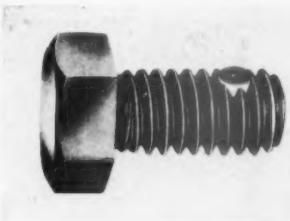
CITY_____ STATE_____

AMERICAN PRESSED-STEEL HAND TRUCKS

The American Pulley Company

4212 WISSAHICKON AVE. ● PHILADELPHIA 29, PA.

rotary machinery, to study underwater sound, similar tasks. Not affected by changes in humidity. Tube Dept., Radio Corporation of America, RCA Victor Div., Camden, N. J.



SELF-LOCKING CAP SCREW with nylon insert set into one side of threaded segment for tight mating of threads. Insert unaffected by oil, gasoline, moisture, ordinary solvents; does not shrink, harden, become brittle; withstands temperatures above 250 deg. F. Diamond Head Screw Corp., 6715 Hollywood Blvd., Los Angeles 28.

FOOD SERVICE. Pamphlet, "Guide to Safe Food Service," basis for 3-session course on safe food service. Also strip film, "Safe Food for Good Health," motion pictures, "Twixt the Cup and the Lip," and "Hash-slingin' to Foodhandling." Federal Security Agency, Public Health Service, Washington, D. C.

ABRASION TESTING SET. Model 100-109. Standardized abrasive wheels test surface finishes on electroplate, porcelain enamel, organic coatings, leather, glass, plastics, woven textile fabrics. Automatic adjustable timer, switches for combination of operation conditions, on control panel. Can test 2 specimens at once. Taber Instrument Corp., 124 Goundry St., North Tonawanda, N. Y.

MODEL REPORT. Functional operating report to employees, based on income and expenditures of imaginary company. Written to help management get industrial facts to employees in non-technical, understandable, factual manner. Tested on 1,500 members of Macfadden Wage Earner Forum, a cross-section of non-executive workers. Copies of model report and of survey of

Here's your annual fuel saving with Insulux

INSULUX
GLASS BLOCK®
AMERICAN STRUCTURAL PRODUCTS COMPANY
Subsidiary of
OWENS-ILLINOIS GLASS COMPANY

● Year after year, Insulux Glass Block saves money in many ways.

Through reduced fuel costs, for example. Your own fuel savings* with Insulux can be readily determined by reference to the chart at right.

For instance: In Indianapolis, the saving is 7.5 cents per square foot (or $75.00 per thousand square feet) each winter. Such savings are possible because of the high insulating qualities of Insulux.

Saves in other ways, too

The unique combination of advantages in Insulux Glass Block means other savings, also.

Maintenance costs are reduced. Insulux does not require paint or other treatment. Insulux does not rot, rust or corrode. And Insulux can be easily and quickly cleaned with soap and water.

Less condensation also results when Insulux Glass Block is installed. This makes possible a more accurate control of humidity, means better operating conditions for machinery and personnel.

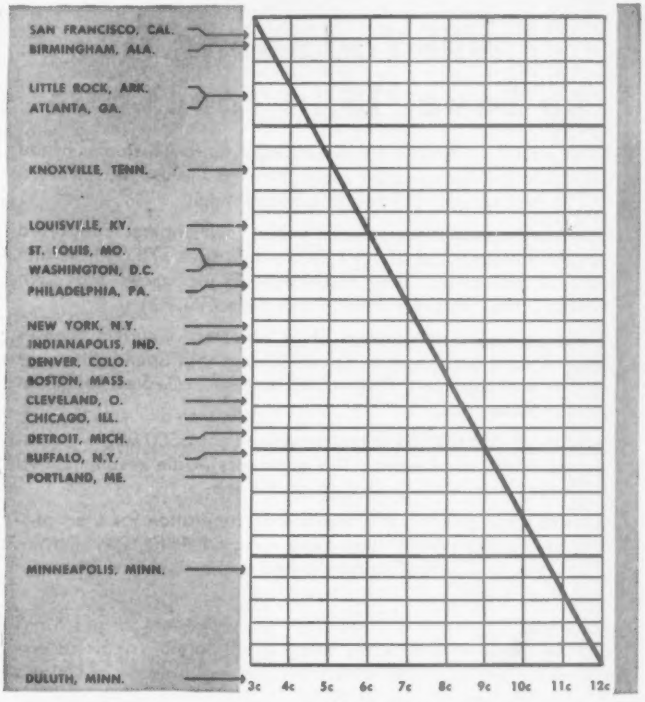
New buildings or old, Insulux saves

Added up, the savings with Insulux are substantial. For replacement of existing sash, or for new construction, it's worth your while to investigate Insulux Glass Block. Send coupon today for more information.

★ ★ ★

** This saving is based on coal at $10.00 a ton in the bin. Since coal costs are up 100 per cent or more over pre-war prices, your saving is up proportionally. These figures are also based on a temperature of 72° inside during 12 hours of the day and 58° for the other 12 hours—conservative figures.*

Find your city (or city nearest you) on the left hand margin (information on your own city gladly supplied on request). Follow over to the diagonal line. Then drop down to the figure at the bottom of the chart. This is the number of cents you will save each winter for every square foot of glass block* exterior wall panel you use instead of single glazed sash.



SEND COUPON FOR FREE BOOKLETS

AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. E-101, P.O. Box 1035
Toledo 1, Ohio

Gentlemen:

Please send me booklets and information checked:

- ☐ "Daylight in Public Buildings"
- ☐ "Daylight in Industrial Buildings"
- ☐ Fuel savings for my city

Name_____

Firm Name_____

Address_____

City_____ Zone____ State_____

Will You Spend $1 to Save $15 in Tool Costs

Three manufacturers recently completed thorough studies of the savings to be made in their plants through the use of a modern tool control system. The results amazed them!

One plant operates several tool cribs. Their engineers reported that an investment of about $5000 would save $73,000 the first year of operation. They recommended McCaskey Tool Crib Control. They actually saved more than $90,000.

The engineers of the second plant reported annual purchases of small tools and possible annual savings that opened the eyes of their management. They recommended McCaskey Tool Control for three cribs.

Savings of $65,000 on a tool investment of $500,000 were reported in the third plant. The engineers again recommended McCaskey Tool Crib Control to do the job.

Each of these plants has a world-wide reputation for alert production management. They have invested millions in modern production equipment but overlooked economies from adequate control of tools.

Facts from the results of numerous users prove that large savings can be made in practically every plant loaning tools to employees. They represent widely varying requirements . . . plants employing from as few as 50 or 75 to fifty thousand or more and operating one or many tool cribs.

Let us have a representative explain how McCaskey will pay its way from the beginning in your plant . . . or send *you proof of savings* in several well-known plants.

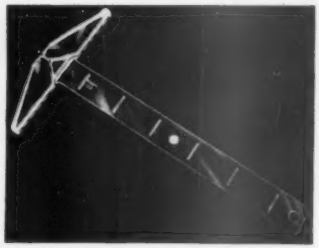
McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

worker opinion concerning it available without charge. American Economic Foundation, 295 Madison Ave., New York 17.



PLASTIC T-SQUARE, head and blade molded in one piece. Transparent shatterproof plastic. Cross-ribs on blade prevent ink smears. Instrumaster Industries, 2456-165A West Jackson Blvd., Chicago 12

BOOKLET, "Production Management: Costs; Wages; Labor Relations." 46 pages. Definitions of topics listed, their significance, suggested solutions to problems involved. Albert Ramond & Associates, Tribune Tower, Chicago 11.

TELEPHONE DICTATION RECORDER with "beep-beep" signal required by F.C.C. when recording telephone conversations of two or more persons. Called Time-Master. High-frequency tone of signal clear, but does not disturb conversation. Beeps every 15 seconds. Dictaphone Corp., Graybar Bldg., New York 17.

FILMS

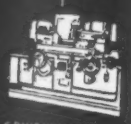
Of This We Are Proud, documentary film, based on personages, places, and events historically significant in building American way of life. Color, sound; 16 mm.; 25 minutes. Kelvinator, Div. of Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit 32.

Indian Paint portrays story of wire rope, from the making of steel from ore to finished product. Color, sound; 35 minutes. The Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div., Palmer, Mass.

Steam For Power depicts development and application of modern steam boilers. Traces history of man's effort to obtain power by use of steam. Sound, color; 41 minutes. The Babcock & Wilcox Co., 85 Liberty St., New York 6.

Voice Sentinel, sound-motion picture, describes role of quartz crystal in present-day communication systems, its application to the frequency control of many channels in a single conductor. Available in both 16 and 35 mm.; approximately 15 minutes. Western Electric Co., Inc., 195 Broadway, New York 7.

GRINDING WHEELS



GRINDING MACHINES

REFRACTORIES

NORBIDE

NON-SLIP FLOORS

LABELING MACHINES

ABRASIVE PAPER AND CLOTH · · · SHARPENING STONES

. . . the tree became a newspaper through GRINDING!

WAY back in the woods Norton starts to have a part in producing your newspaper—axes and saws sharpened by Norton grinding wheels fell the trees and cut them to pulp wood lengths.

Then at the paper mill the wood is ground into pulp for newsprint by Norton Pulpstones—gigantic ten-ton, segmental grinding wheels as large as six feet in diameter and as wide as 66″—wheels developed by Norton research to replace nature's sandstones.

The machines that convert the pulp into paper and the complicated presses which print your newspaper contain many rolls and other parts precision-produced by Norton grinding machines and grinding wheels.

Norton Refractories are important, too—Alundum Laboratory Ware is used in the paper mill laboratories, Crystolon Brick in the power plants.

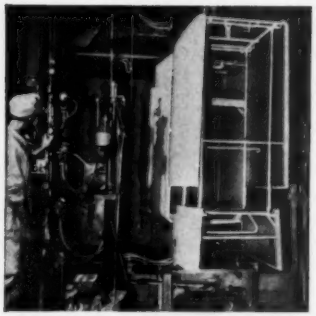
NORTON

NORTON COMPANY • WORCESTER 6, MASS.

(Behr-Manning, Troy, N. Y., is a Norton Division)

MODERNIZE WITH ELECTRO-SPRAY

RANSBURG



• ON REFRIGERATOR CABINETS, Electro-Spray turns out 45 per cent more production in less floor space . . . will save over $100,000 annually on just one coat.

• ON TRUCK SIGNAL FLARES, Electro-Spray competes with former dipping operation in paint mileage and increases production 50% with no increase in labor.

• LARGE product or Small, you can save 40 to 60 per cent

Operating records on product after product —large and small, even articles which never before could be painted automatically—prove that it pays to modernize with Ransburg Electro-Spray.

By letting electrostatic forces do the work, Electro-Spray saves 40 to 60 per cent on paint alone . . . usually reduces spray stations to just one booth, manned by one attendant . . . and holds rejects to a fraction of other methods.

Ransburg engineers are ready to help you investigate the advantages of Electro-Spray as applied to your particular production painting operations.

RANSBURG

RANSBURG ELECTRO-COATING CORP.

Indianapolis 7, Indiana

GUARANTEED PITTSBURGH

ARMORED GEARS

Outlast Untreated Gears 5 TIMES!

That's right . . . 5 to 1! What's more, Pittsburgh ARMORED GEAR Line lasts 1 to 1½ times longer than oil treated gears, and will equal or excel the life of *any other heat treated* ones. That is not just a promise. It's our GUARANTEE!

WRITE FOR QUOTATIONS

ARMORED GEARS

PITTSBURGH GEAR COMPANY | 27th & Smallman Streets PITTSBURGH 22, PA.

QUALITY GEARS FOR OVER 30 YEARS

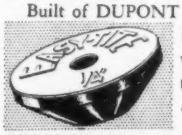
EVERY TIME— THIS TEST PROVES

SEXAUER

"EASY-TITES"

OUTLAST ORDINARY FAUCET WASHERS 6 TO 1!

Comparative tests in plants, hospitals, schools and colleges, hotels, utilities, institutions and military establishments have proved the same fact time after time. "EASY-TITES" outlast ordinary faucet washers 6 to 1!



Built of DUPONT NEOPRENE and fabric-reinforced like a tire, pat'd. "EASY-TITES" withstand absorption and extreme temperatures (upwards of 300° F); can't split or mush out of shape.

FREE! VALUABLE 112-PAGE CATALOG

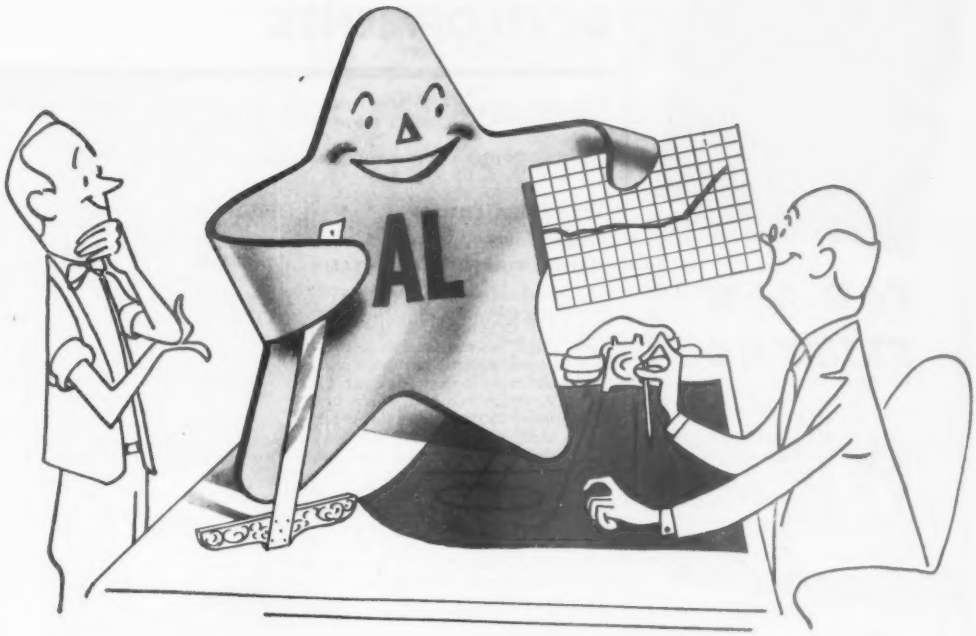
"EASY-TITES" and 2,300 other 'SEXAUER' Triple-Wear Replacement Parts and pat'd. Precision Tools are advertised in *THE SATURDAY EVENING POST* and standard with leading maintenance engineers. This highly specialized line is listed and illustrated in the big, new 112-page 'SEXAUER' catalog. Send a post-card for your free copy — TODAY.

J. A. SEXAUER MFG. CO., INC.

2303-05 Third Ave., New York City 51. (Dept. F-1)

SEXAUER

SPECIALISTS IN PLUMBING AND HEATING MAINTENANCE MATERIALS FOR 27 YEARS



● Want a competitive edge?
Design for permanence and sell permanence
with Allegheny Metal, the pioneer stainless steel.
It's cheapest in the long run
because it lasts a lifetime . . .
it fabricates easily, and best of all,
you can get Allegheny Metal promptly.

Complete technical and fabricating data—engineering help, too—yours for the asking.

ALLEGHENY LUDLUM STEEL CORPORATION

The Nation's Leading Producer of Stainless Steel in All Forms

Pittsburgh, Penna. . . . Offices in Principal Cities

Allegheny Metal is stocked by all Jos. T. Ryerson & Son, Inc., Warehouses

FAR-AIR* FILTERS

Performance Leader
in Commerce

People buy more and work better in cool, clean, air conditioned buildings. That is why progressive commercial institutions are interested in *clean* air and are standardizing on Far-Air Filters. The *herringbone-crimp* design assures dependable higher performance, larger dirt holding capacity, lower pressure loss, easier cleanability, reduced maintenance costs.

Among the users of Far-Air Filters are:

Bank of America
F. W. Woolworth Co.
Fred Harvey Restaurants
I. Magnin Co.
National Broadcasting Company
Rexall Drug Company
Savoy Plaza Hotel
U. S. Armed Forces

A well-equipped testing and development laboratory is maintained for research in all types of filtration problems. Farr engineers are available in your territory to serve you. Write Farr Company, Los Angeles 43, Calif.

FAR-AIR FILTERS
"Better by Farr"
*Trade Mark Reg.

FARR COMPANY
Manufacturing Engineers
Los Angeles • Chicago • New York

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University and a Member of the New York Bar

Period Surveyed: November 1 to December 1

Trend Indicators

Wage Hours

SLEEPING TIME HELD COMPENSABLE

The court held that night switchboard operators should be compensated for sleeping time they spent each night at the telephone company's exchanges. The operators in this case were on an 11-hour tour of duty, which required them to go on duty at 9 p.m. and to remain there until 8 a.m. the following day. The difference between the time compensated for and the 11 hours was designated as sleeping time, and a cot was furnished by the company and placed in a room near the switchboard so that the operator might spend such time as her duties permitted in rest or sleep.

It was pointed out that the operators were not permitted to leave the switchboard room all the time they were on duty and that they were not there for the purpose of sleep nor for any purpose of their own, but for employer's benefit. In determining whether sleeping time is working time, the court has to consider whether the employee is subject to call without being required to perform active work, the extent to which he is free to engage in personal activities during periods of idleness, and whether he is required to remain on or about the premises during such time.

The court found that the employees in this case were required to be on the employer's premises, accessible to the switchboard on duty, and were charged with the responsibility for the proper operation of the exchanges under their charge. The court concluded, therefore, that they were performing compensable activities during the entire 11 hours spent at the exchange. (Central Missouri Telephone Company v. Conwell, CCA-8)

RELIANCE ON CIRCULAR LETTER HELD TO BE GOOD FAITH DEFENSE

Section 9 of the Portal-to-Portal Act, known as the Good Faith Defense Section, was interpreted to relieve employers who relied on a "circular letter" of the Navy Department, Bureau of Yards and Docks, of their liability on account of failure to pay overtime compensation. The court held that the circular letter which contained instructions for the payment of compensation for employment in excess of the normal work week was an "administrative regulation, order, ruling, approval, or interpretation of any agency of the United States." (Kenney v. Wigton-Abbott Corporation, USDC N.J.)

COMPANY PRODUCING MUNITIONS FOR U. S. HELD NOT EMPLOYER

A company which produced munitions at an ordnance plant for use by the United States in the war was held not to be an "employer" of employees within the meaning of the Act, since the company acted under contract reserving to the United States the right to control the work at the plant including hiring, firing, and supervision of employees. The court held that the company was at all times an agency of the United States. (Assel v. Hercules Powder Company, USDC Kansas)

ABILITY TO PAY CONSIDERED BY ARBITRATOR

An arbitrator denied a retroactive wage increase, and permitted management to deduct from a warranted wage increase a portion which management was to contribute to the welfare fund, where it found that the company was financially unable to grant either of the union demands since it had operated at a deficit for the past 14 months.

Concerning the unfavorable financial condition of the company, the arbitrator said, "While ability to pay is not a controlling factor in determining the level of wages to which employees are entitled, economic considerations of the magnitude cited above cannot be brushed aside. An increase in wages is clearly called for, but a retroactive payment to some specified date, to which the employees would be entitled under ordinary circumstances, would represent an unjustified strain on the employer's financial structure in this instance." (A'Cadia Powder Puff Company.)

HELD TO HAVE VIOLATED CHILD LABOR PROVISIONS

An employer was held to have violated the child labor provisions of the Fair Labor Standards Act when

Reasons Why

THE *Finnell* DRY SCRUBBER CLEANS FASTER... More Thoroughly

A unique combination of labor-saving features is responsible for the greater speed and thoroughness with which the *Finnell* Dry Scrubber cleans grease-caked floors.

Equipped with two powerful scarifying brushes, this *Finnell* digs through and quickly loosens the most stubborn coatings of dirt, oil, grease, and shavings—as the special couplings adjust brushes to floor irregularities, to get into indentations and grooves that rigid coupling brushes would pass over and miss.

To re-sharpen the brushes of the *Finnell* Dry Scrubber, simply *flip the switch.* That reverses the motion of the brushes and re-sharpens them *automatically* . . . while working. Eliminates the need for frequent changing of brushes by hand in order to maintain a good cutting edge.

Low construction makes it easy to clean around and beneath equipment, and the adjustable handle adapts the machine to operator's height for most effective working position.

Various types and sizes of wire scarifying brushes are interchangeable in the brush rings of this *Finnell* and, with other brush rings, the machine can be used for wet scrubbing, steel-wooling, waxing, and polishing. Ruggedly constructed. Has heavy duty G. E. Motor, oversize Timken Roller Bearings, special bronze worm gears, leak-proof gear case.

For free floor survey, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

STANLEY HAMMERS
...each designed to do its job better

IN the broad line of Stanley Hammers are types eminently fitted for a wide variety of work in industrial plants. Each of the types illustrated here is for a different kind of work.

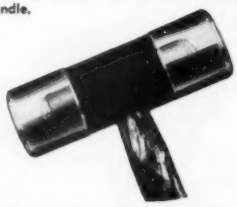
For the packing and shipping room and building maintenance work, the No. 51½ Stanley Nail Hammer. For machine shop and product service work the No. 310 Ball Pein Hammer and the No. 232 Machinist's Riveting Hammer. For assembly and light metal forming, the No. 594 Soft Face Hammer. Each is available in a variety of weights and sizes to meet all industrial needs.

Standardize on Stanley Hammers — in all departments of your plant — for maximum efficiency. Stanley Tools, New Britain, Conn.

Stanley No. 51½ Nail . . . head forged from special analysis steel, super heat treated. Young, straight grained hickory handle pre-shrunk and securely wedged in head.

Stanley No. 310 Ball Pein . . . polished head of super heat treated steel with pre-shrunk, selected white hickory handle.

Stanley No. 232 Machinist's Riveting . . . head is super heat treated — for extreme toughness. Has pre-shrunk hickory handle.



Stanley No. 594 Soft Face . . . Renewable tips of tough, resilient celluloid composition. Pre-shrunk hickory handle secured in steel center body. 8 oz. head — other sizes available. For all types of work on finely finished surfaces.

THE TOOL BOX OF THE WORLD
STANLEY
Reg. U.S. Pat. Off.

HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING

LABOR DEVELOPMENTS *(continued)*

he employed child labor in the manufacture of books and book covers and knew that 7 per cent of the output would be shipped in interstate commerce by the purchasers, although title passed to purchases within the state of manufacture. The court held that Section 212 of the act, prohibiting child labor, which states, "no manufacturer shall ship or deliver for shipment in commerce . . ." is sufficiently broad to cover a situation in which the manufacturer, having the knowledge that the final destination of his goods is in interstate commerce, sells to a concern which makes the actual shipment. (Tobin v. Grant., USDC N. California)

Labor-Management Relations

*DISCHARGED EMPLOYEE NOT ENTITLED TO SEVERANCE PAY

Where the contract grants severance pay to employees discharged for "unsatisfactory performance" but denies it to those employees discharged for "malfeasance," an employer was held justified in refusing to grant severance pay to an employee who was discharged because of a record of excessive tardiness. The arbitrator pointed out that "the agreement clearly distinguishes between inefficiency or incompetence on the one hand and, on the other, misbehavior within the individual employee's control and unrelated to the proficiency with which he discharges his assigned duties." According to the severance pay provisions, the employer agrees to grant severance pay to an employee who, after completing his probationary period, proves at a later date to be incapable, since in such a case the employer has had an opportunity to observe the employee's work during a trial period. However, when the employee, subsequent to the probationary period, becomes guilty of malfeasance, including misconduct, the employer has had no previous chance to observe the employee's behavior and to terminate the employment before a permanent status is achieved. (In re arbitration between Zionist Organization of America and United Office and Professional Workers of America)

*EMPLOYEE ENTITLED TO SICK LEAVE PAY

An employee who was absent because of illness during a period when the entire plant was shut down by strike was held entitled to sick leave pay, since the contract called

* In this classification, items marked with an asterisk also are considered to be trend indicators.

THIRTY COPPER-OXIDE RECTIFIERS

Keep Electric Trucks on the Move

Moving more than 500,000 pounds of material each week through the Pentagon Building in Arlington, Virginia, 30 industrial trucks are kept on the job by this efficient installation of General Electric copper-oxide rectifiers.

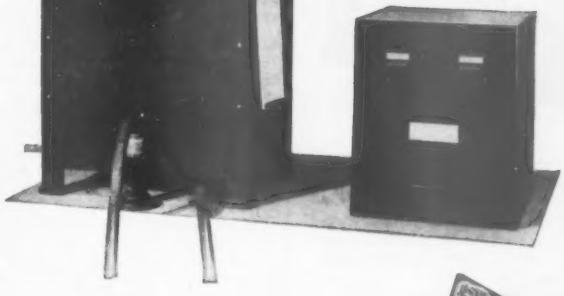
IN THE PENTAGON

To move material fast through the 35-acre Pentagon Building, 4,500 pallets, 500 skids, and 51 trailers are handled by a fleet of 30 electric industrial trucks. To keep these trucks at peak efficiency, a well-organized charging room makes use of 30 General Electric copper-oxide rectifiers.

In this layout, each truck has its own numbered stall, equipped with a General Electric rectifier, filling hose, and record board. Charging and battery maintenance are systematically handled during the night shift, records are brought up-to-date on each truck, and the fleet is ready for its job in the morning.

RECTIFIERS FIT YOUR LAYOUT, FIT YOUR HANDLING NEEDS

Whether your setup calls for a centralized charging station like the Pentagon Building layout, or rectifiers strategically spotted on truck routes — General Electric copper-oxide rectifiers do the job the way you want it done. SMALL, they take little space—can be used right in work areas. STURDY, they give years of service, because there are no moving parts except the ball-bearing-equipped cooling fan. EFFICIENT, they operate with no noise; time the charge; shut off automatically; and disconnect both from the incoming line and the battery.

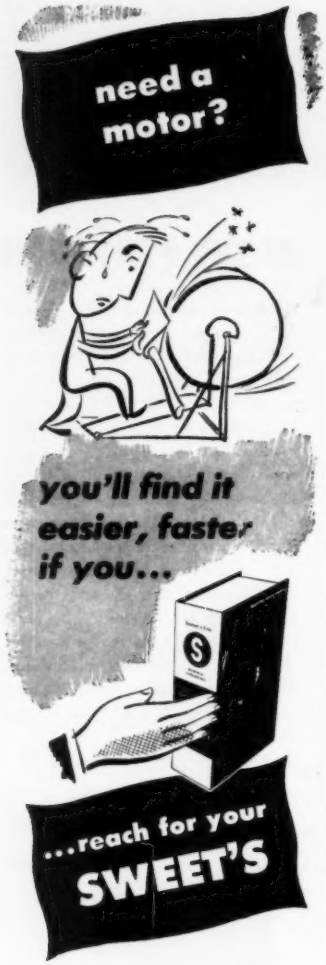


CHECK DIMENSIONS • CHECK PERFORMANCE

The booklet, *Aids to Economical, Faster Material Handling*, gives dimensions and performance characteristics on General Electric copper-oxide rectifiers. Check them with your own layout and performance demands. For your free copy, write to Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

456-9



When you need specific information on materials, equipment or services, reach for your Sweet's File for the Process Industries (the big gray file). It contains 212 manufacturers' catalogs full of useful information on thousands of products . . . from absorbers—gas, to wood preservatives. Cross indexing speeds finding.

If Sweet's File for the Process Industries is not available in your office, make request immediately for application form. Files are distributed FREE to qualified organizations and individuals.

Sweet's

CATALOG SERVICE

for easier, faster selection of products

119 W. 40th ST., NEW YORK 18, N. Y.

LABOR DEVELOPMENTS *(continued)*

for sick leave pay to those employees who were out ill during the "regularly scheduled 40-hour workweek." The company cannot claim that employees are entitled to pay only if there is a regularly scheduled workweek, since the clause was not meant to be conditional on the existence of such a workweek, the arbitrator declared. It was further pointed out that when the contract was negotiated, neither party anticipated that the plant would be shut down for a week or more, least of all because of a strike. (In re arbitration between Outboard Marine & Manufacturing Company and Independent Marine & Machinists)

***EMPLOYER PERMITTED TO SCHEDULE NIGHT WORK**

An employer was held to be within his rights in rescheduling hours so as to include in the employees' regular shifts hours after 5 P.M. when he believed that night work would aid in decreasing costs and increasing efficiency. The arbitrator rejected the union's contention that the limited volume of business did not justify the night work which caused severe inconvenience to the employees, since the employer's change was based on the need to survive. The arbitrator further pointed out that the company definitely has the right to assign night work provided it pays the night work differential. (In re arbitration between Everett Dyers and Cleaners and Amalgamated Clothing Workers of America)

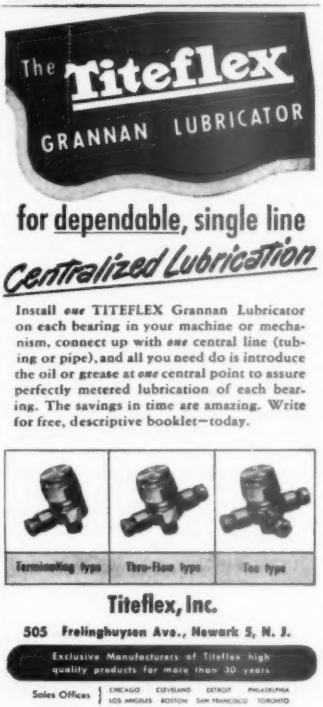
***EMPLOYER JUSTIFIED IN CLOSING HIS PLANT AS PENALTY FOR EXCESSIVE ABSENTEEISM**

An employer was considered justified in closing down his plant one Monday in order to avoid operating at a loss and as a penalty for the employees' continued and unusually high rate of absenteeism on previous Mondays. The arbitrator refused to regard the employer's action a lockout in violation of the contract, since the shutdown was caused by business exigencies. The arbitrator further pointed out that "there is nothing in the agreement between the parties which may be said to require the company to operate at a loss." (In re arbitration between National Union Radio Corporation and United Electrical, Radio and Machine Workers of America)

***HELD NOT DISCRIMINATORY**

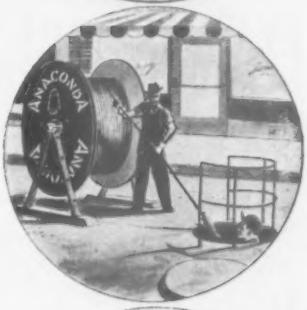
An employer was held not guilty of discrimination when he denied continuous service credit to economic strikers when the effect of such action was to deny to the strikers the accrual of vacation and pension benefits during the strike period. The NLRB pointed out that deferred

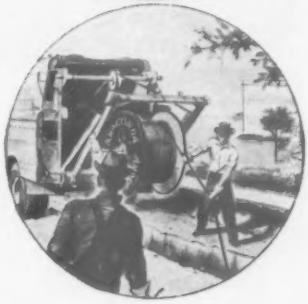
KRANE KAR
CUTS COST OF MATERIALS HANDLING
Write for Bulletin #79
KRANE KAR Loads and Unloads freight cars, trucks, trailers; Stores materials; expedites Plant Maintenance. Often cuts cost of handling loads to 8c a ton.
No Mobile Crane made today can match KRANE KAR speed, safety, and economy of operation . . . picking up, carrying, and placing loads . . . anywhere, in plant or yard . . . uneven terrain, congested areas, low overhead, up and down ramps.
Gas or Diesel. Solid cushion or Pneumatic Rubber Tires.
THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
7½, 8, AND 10 TON CAPACITIES
KRANE KAR
TRADE MARK REGISTERED
SILENT HOIST & CRANE CO.
855 63rd ST., BROOKLYN 20, NEW YORK


The Titeflex
GRANNAN LUBRICATOR
for dependable, single line
Centralized Lubrication
Install one TITEFLEX Grannan Lubricator on each bearing in your machine or mechanism, connect up with one central line (tubing or pipe), and all you need do is introduce the oil or grease at one central point to assure perfectly metered lubrication of each bearing. The savings in time are amazing. Write for free, descriptive booklet—today.
Terminating Type
Thru-Flow Type
Tee Type
Titeflex, Inc.
505 Frelinghuysen Ave., Newark 5, N. J.
Exclusive Manufacturers of Titeflex high quality products for more than 30 years
Sales Offices CHICAGO CLEVELAND DETROIT PHILADELPHIA LOS ANGELES BOSTON SAN FRANCISCO TORONTO

PICK ANY SPOT... THEN PICK

Durasheath





FOR POWER DISTRIBUTION, you can use a single type and size of Durasheath cable—whether it's small or large—one, two or three conductors—in runs that are in the air, in conduit or directly in the ground.

ADVANTAGES IN DURASHEATH:

High tensile strength and strong resistance to flame and abrasion.

Extreme flexibility that makes handling easy.

Resistance to moisture, acids and alkalies generally found in the soil.

No problems of electrolysis, corrosion and extremes in temperature.

Write for Bulletin DM 4820, "Durasheath, the All-Purpose Cable."

6547D

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4, N. Y.

THE ALL-PURPOSE CABLE

Anacondaloy*-coated copper conductors are insulated with a moisture-resisting synthetic rubber compound, bound with color-coded rubber-filled tape and enclosed in a tough, high mechanical strength, moisture- and flame-resistant outer jacket of Neoprene. Conductors have the lasting protection of a solid block of synthetic rubber and Neoprene.

*Reg. U. S. Pat. Off.

ANACONDA

from mine to consumer

More Power to You!
Through LEWIS-SHEPARD ENGINEERING LEADERSHIP
It's NEW
"IT LIFTS AND LOWERS AS IT HAULS"
4000 LB. CAPACITY
Telescopic Straddle Type
"JACKSTACKER"
See It At The
NATIONAL MATERIALS HANDLING SHOW
PHILADELPHIA JAN 10-14, 1949
"JACKSTACKER"
ELECTRIC TIERING TRUCK
Capacities to 4000 lbs. No Similar Type Truck Carries 4000 lb. Pay Load. Load always over Wheels
• TO MOVE AND STACK UNIT LOADS on all skids and pallets. 4 types: Straddle; Counterweight; Open end Base; Platform.
• Telescopic, High Stacking feature (available all models) allows easy passage under door frames and other obstructions.
• Takes Much Less Room . . . and light dead weight of "JackStacker" makes it ideal where floors will not support Fork Trucks or cramped quarters make them impractical. The "JackStacker" means NARROWER AISLES for you.
• All Controls in Handle Head — 2 speeds forward and reverse, lifting, lowering, horn and lock, plus instant smooth-action electric brake, constantly applied type. Controls operate with handle any position. No need to halt "JackStacker" to raise or lower carriage. No similar type truck has this basic advantage. "It lifts and lowers as it hauls".
• Master Drive Unit, mounted on articulated linkage, gives good traction over ramps, sills, uneven floors. Only takes 20 minutes to change Master Drive Unit assembly.
OPEN FACE PALLET TYPE
PLATFORM TYPE
EST. 1915
SEND for BULLETIN No. 95
Designers, Engineers, Manufacturers of over 250 standard and variable types of Industrial Handling Equipment
Let us help you save money. Write or Wire.
MULTIPLY MANPOWER
LEWIS-SHEPARD
THE "MASTER" LINE of Industrial Handling Equipment
LEWIS-SHEPARD PRODUCTS INC.
314 WALNUT ST., WATERTOWN 72, MASS.
Midwest Plant: Crawfordsville, Ind.
REPRESENTATIVES IN PRINCIPAL CITIES (Lewis-Shepard) CONSULT YOUR PHONE DIRECTORY

LABOR DEVELOPMENTS *(continued)*

benefits, such as retirement and vacation benefits, are in reality a form of wages and that "it is axiomatic that the company is not required under the act to finance an economic strike against it by remunerating the strikers for work not performed." (General Electric Company and United Electrical, Radio and Machine Workers of America; NLRB)

***IN ABSENCE OF SENIORITY CLAUSE EMPLOYER MAY DISCONTINUE PROMOTION FROM WITHIN**

Where the contract contained no seniority provision, an employer was permitted to discontinue his past practice of promoting from within. The arbitrator rejected the union's contention that custom sets the precedent which should be controlling, since the company's past practice was based on "sheer necessity" resulting from the shortage of skilled labor replacements in the area. The company claimed that its past method of promoting men from the ranks was a costly method of recruiting and "rather than an evolving custom, a sheer necessity with no other available alternative." (In re arbitration between Lawrence Clothing Manufacturing Company et al. and Amalgamated Clothing Workers of America)

***EMPLOYER MAY DENY LEAVE OF ABSENCE TO UNION OFFICIAL**

Under a contract providing that "any employee being duly elected to a permanent office in, or as a delegate to, any labor activity, necessitating a temporary leave of absence, shall be granted such leave of absence . . .," an employer was held to have the right to deny a leave to an employee, subject to grievance filing, on the ground that the leave was not requested for "bona fide" labor activity.

The union contended that what constitutes a labor activity is a matter of the internal affairs of the union and that the determination of what constitutes a labor activity for which a leave may be obtained by the union and granted by the company lies solely within the union. The arbitrator rejected the union's contention and said: "The above provision of the contract means that the company's obligation to grant leaves of absence does not arise until or unless it has been made to appear that the circumstances (or terms or conditions), under which it has agreed to grant leaves of absence, do in fact exist." The arbitrator pointed out that it is the duty of the union first to inform the company of the name and union position of the employee for whom the leave is requested and the nature of the activity for which the leave is asked, and, second, to establish the fact that the

HERE'S HOW PITTSBURGH'S

hydro-lub

assures circulating lubrication

1 EVERY TIME VALVE IS OPENED OR CLOSED . . .
PITTS
2 . . . THIS PISTON FORCES THE LUBRICANT THROUGH THE PLUG AND BODY DUCTS . . .
3 . . . LUBRICATING ALL CONTACT SURFACES

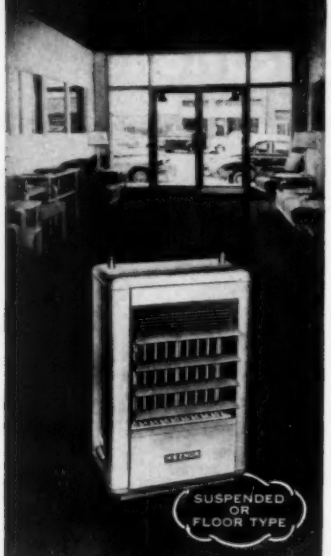
Available in
175 lb. W.O.G. and
500 lb. W.O.G.

WRITE FOR FREE BOOKLET

PITTSBURGH

SINCE 1902
PITTSBURGH VALVE & FITTINGS CORP.
BARBERTON, OHIO, U.S.A.

Automatic
REZNOR
gas fired unit heaters



POPULAR

Reznor engineering and production are devoted exclusively to the manufacture of gas fired unit heaters. More Reznors are bought than any other. Reznor heating is ideal for industrial plants, offices and stores. Catalog shows special features. Write today.

- FULLY AUTOMATIC
- EXTRA LARGE FAN
- SPECIAL HEAT EXCHANGER
- STRONGER CONSTRUCTION
- MORE ECONOMICAL
- LOW COST INSTALLATION
- ALUMINIZED STEEL INTERIOR UNIT

REZNOR MANUFACTURING CO.
6 UNION ST. · MERCER, PENNA.
Gas Heaters Since 1888

LABOR DEVELOPMENTS *(continued)*

employee for whom the leave is requested is "an employee elected to a permanent office in, or as a delegate to, any labor activity," and that such activity constitutes a "labor activity, necessitating a temporary leave of absence." (In re arbitration between Carter Carburetor Corporation and United Automobile, Aircraft and Agricultural Implement Workers of America)

***EMPLOYER MAY NOT UNILATERALLY CHANGE HOURS**

When the employer has for the past few years scheduled certain employees for 48 hours per week, with 8 hours at overtime, he may not unilaterally change this practice of scheduling hours, despite the fact that the contract contains no provision for their hours. Said the arbitrator, "until the parties negotiate and reach agreement the well established past practice must be followed, since the company does not have the right to suddenly, unilaterally, and without collective bargaining put a new schedule of hours or wages into effect." (In re arbitration between Kroger Grocery and Baking Company and International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America)

***UNION SHOP CHAIRMAN JUSTIFIABLY DISCHARGED**

A union shop chairman was held to be justifiably discharged when he instigated a strike in violation of the contract clause banning strikes. When the dispute first arose, the shop chairman should have instructed the employees to follow the grievance procedure instead of taking direct action in violation of the agreement, the arbitrator declared. Since the past record revealed that the company was always willing to abide by the contractual requirements as to grievance and arbitration, the shop chairman was unjustified in taking the matter into his own hands and urging the others to disregard their commitments, in the opinion of the arbitrator. (In re arbitration between Everett Dyers & Cleaners and Amalgamated Clothing Workers of America)

***EMPLOYEES ENTITLED TO GUARANTEE**

Under a contract providing that employees shall be guaranteed 40 hours per week, baker employees were held entitled to the full guarantee despite the fact that they didn't work 3 days during the workweek, having been told by the employer not to report because of a strike by teamsters. The union's contention, accepted by the arbitrator, was that once a workweek has started, the

TRUE IN 1899 . . .
TRUE TODAY
You Get
BETTER MARKING
with
Pannier
"MASTER MARKERS

Steel Forging Stamps —Hand, Eye & Fullered

Stamping Dies

"Supreme" Steel Type & Holders

Famous in the steel industry for their durability and "good impressions," these Pannier "Master Markers" are *still* your best bet for efficient and clear-cut marking of steel and steel products. Write for full information today.

Extra Fillet, Double Bevel Steel Stamps — letter, figure, symbol, name.

Roller Dies and Segments

Embossing Dies (female shown)

Offices:
Pittsburgh Chicago
Los Angeles Youngstown
Philadelphia

THE PANNIER CORPORATION
201 Pannier Bldg.
Pittsburgh 12, Pa.

Gardner-Denver Horizontally Split-case Double Suction Centrifugal Pump —one of many Gardner-Denver types.

Two things are needed to provide complete satisfaction when you buy a centrifugal pump—a quality product *and* quality service. For often you want skilled advice in choosing exactly the pump for your needs—advice backed by research and field experience. Often, too, you require friendly, expert help in getting the most out of your pump after it is installed.

All Gardner-Denver Centrifugal Pumps are sold with this backing of service—always at your command—always available at your call. Gardner-Denver branch offices, located in principal centers throughout the country, stand ready to keep your Gardner-Denver pump at peak efficiency year after year.

For superior pumps—AND superior service—write Gardner-Denver.

Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER SINCE 1859

LAMSON Conveyors

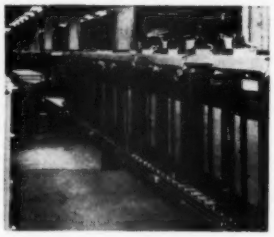
SPEED assembly line production.

SPEED flow of materials.

SPEED handling of finished products.

SPEED. That's the word that best describes Lamson Conveyors. In plant after plant, Lamson Conveyors — specifically applied for specific needs — cut materials handling costs at least 30%! And that's a saving. A *big* saving.

SAVE Wasted Effort... Handling Time and Valuable Floor Space.



In the large Westinghouse Home Radio Division Plant at Sunbury, Pa., the interlocking system of Lamson Conveyors eliminates bottlenecks . . . saves wasted effort . . . and many handling costs.

In the main illustration, radio receivers literally "roll" up to the inspectors on the lower conveyor line. After rigid inspection, they go to the cabinet section for installation and final inspection via the overhead Lamson Conveyors.

No wasted time. No wasted effort. No wasted footsteps.

***Mail* this coupon today for Free Booklet!**

Read how Lamson Conveyors can cut your handling costs up to 30%!

Lamson Corporation
130 Lamson Street
Syracuse 1, New York

Please send me further information about your CONVEYORS.

I am interested in moving _____
(Type of product or material)

Name .....

Position .....

Company ..... **Address** .....

LABOR DEVELOPMENTS *(continued)*

guarantee goes into effect and 40 hours' work or pay must be provided. (In re arbitration between Wheatality Baking Corporation and AFL's Bakery and Confectionary Workers)

***REPLACEMENTS OF ECONOMIC STRIKERS PERMITTED TO VOTE IN REPRESENTATION ELECTION**

The National Labor Relations Board held that a strike which occurred because the parties reached an impasse during negotiations was an economic strike. The board was therefore justified in permitting employees who replaced economic strikers to participate in a representation election, since all the replacements were employed at the time of the election. Section 9(c) (3) of the Labor-Management Relations Act provides only that employees on strike who are not entitled to reinstatement shall not be eligible to vote. (Solar Electric Corporation and Agnes I. Flasher, NLRB)

***INJUNCTION ORDER HELD NOT TO ABRIDGE CONSTITUTIONAL RIGHTS**

An injunction issued on a showing of destruction of property that still permitted peaceful picketing by the union in furtherance of a strike but limited the number of pickets and forbade picketing within 100 yards of any outside boundary of the employer's premises was held not to abridge the constitutional rights of freedom of speech and assembly. Although picketing, when peacefully and lawfully conducted, is considered an exercise of the right of free speech, the court held that when violence is involved and the rights and property of others are destroyed, such action is not sheltered by the Constitution. (United Steelworkers v. Nashville Corp., Tennessee Supreme Court)

***PICKETS HELD TO HAVE VIOLATED INJUNCTION ORDER**

In the opinion of the court, pickets who used profane language and called employees "scabs" and other vile names to keep them from working during a strike were not exercising the constitutional right of freedom of speech. In this instance, there was an existing injunction against use of intimidation to prevent others from working for the employer. The court could not find the actions of the pickets to be protected under the constitutional guarantee of free speech, since "the freedom of speech guarantee, as well as protection of life, liberty, and property of these respondents is dependent upon the majesty of the law, the integrity of the courts and the inviolability of judgments of the courts." (Lassiter v. Swift & Company, Georgia Supreme Court)

Specify Thermoid

Thermoid Impregnation Process* Assures Longer Conveyor Belt Life

Thermoid Conveyor Belts are Built for the Job!

For over 68 years, Thermoid has worked with its distributors and industry to develop rubber products to meet the requirements of every industry. The result —a complete line of Thermoid conveyor and elevator belts for every major industrial application.

Your nearest distributor can service your requirements . . . or if you prefer, write us of your problem and we will furnish full details.

It will pay you to *Specify* Thermoid!

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.

Western Offices and Factory • Nephi, Utah, U. S. A.

Industrial Rubber Products

Friction Materials • Oil Field Products

*Thermoid

Impregnation Process

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasion action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

NEW METHODS BRING "SPECIAL-MOTOR" SMOOTHNESS TO STANDARD MOTORS

Motors have been made in much the same way for many years, until Westinghouse—with many years of leadership in a-c motor developments—departed from "tradition" in electric motor concepts, and built the Life-Line.

Motor-making traditions have been broken by the basketful. Users were surveyed to find what they wanted in standard motors that they were not getting. Life-Line motors were designed and built from scratch—by new methods and new tools in a totally new plant—to include these features.

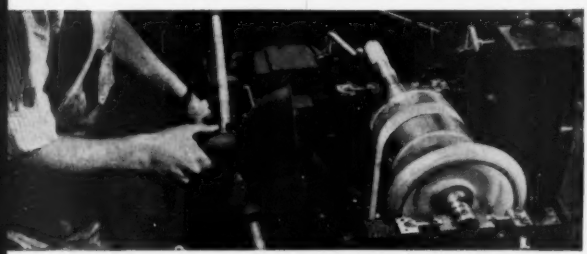
Quieter operation was one feature motor users asked for. It's important in many places—fans, blowers, air conditioning. Life-Line motors provide it. Life-Line ventilating design limits "windage" noise. New manufacturing techniques that insure absolute alignment and accuracy of fit, reduced vibration. The result is a *standard* motor with the quietness and freedom from vibration evidenced in the dramatic demonstration shown opposite. Modern tests check every motor for accuracy in manufacture.

You will want full details on other Life-Line features—its solid steel construction—freedom from lubrication for 5 years or longer—new compactness and light weight. Life-Line motors, now built in sizes from 1-15 hp, are available in standard and near-standard types from stock. Other sizes and types—up to 200 hp—will soon be changed over to modern Life-Line design. Check your nearest Westinghouse office for deliveries—or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21457

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Life-Line motors

MEASURED—WITH AIR New extreme accuracy for checking diameters of shafts and bearing bores is made possible by this precision gauge. Size is checked by any variations in air stream escaping between the part being checked and the master gauge.



EVERY UNIT BALANCED. *Every* Life-Line rotor—not random samples—is balanced on a Dynetric balancing machine* to insure maximum possible freedom from vibration of every unit.
*Reg. U. S. Pat. Off.

MOTOR "ASTHMA" CHECK. Sounds that shouldn't be there don't get by this "noise detective". Audiometer tells noise wave length; sound level meter (left) checks decibel rating; sound analyzer (right) tells the relative amount of different frequencies resulting

Life-Line

SMOOTH? HERE'S PROOF! Coin balanced on edge on a Life-Line motor remains undisturbed as motor is started, runs and stops—dramatic evidence of Life-Line's freedom from vibration and resulting noise!

"MUST IT RUST?" A three billion dollar question that is dramatically answered in our 16 mm sound motion picture. This educational film is one that interests both consumer and producer—and everyone who is concerned with the problems of rust and corrosion should see it.

A print of this film will be gladly loaned—

Regarding availability of this 25-minute sound film in 16 mm size, for showing to your personnel, or to any group in your community, write, The Secretary, American Hot Dip Galvanizers Association, Inc., First National Bank Building, Pittsburgh, Pa.

hot-dip GALVANIZING

THEY SAY AND DO

No-Strike Clause Held Binding

The National Labor Relations Board recently ruled that an employer may legally discipline employees who cause a strike in violation of a no-strike agreement, even though the cause of the strike is an unfair act by the employer.

The case involved the National Electric Products Corporation, Ambridge, Pa. That company discharged a worker at the request of the recognized union in the plant. Five employees picketed in protest and caused 300 employees out of 1200 on the day shift to remain away from work for one day. The company laid off the five workers and later reinstated them.

The Board found that the first discharge was an unfair labor practice. Nevertheless, the picketing was punishable, the board said, and in laying off the pickets the company did not commit an unfair labor practice.

"The Act was designed to encourage collective bargaining as a substitute for strike action," the majority of the board found.

The right to strike, although protected by the Act, may be waived by the employees in an agreement concluded through the collective bargaining process. Thus, in our opinion, there is no basis for the conclusion . . . that we have deprived the employees of a 'basic right' to strike, since the employees themselves waived their right to strike during the life of the agreement.

"As we have heretofore emphasized, 'no strike' clauses, like the one herein, are designed to forestall the use of even permissive economic weapons and to substitute settlement by collective bargaining. They tend to realize the purposes of the Act by encouraging the practice and procedure of collective bargaining rather than resort to industrial warfare."

Industry Urged to Support Social Laws

ERIC JOHNSTON, President, The Motion Picture Association of America, speaking before Chamber of Commerce of the State of New York

I urge American businessmen to recognize the economic facts of life. They no longer have the power. It is in the hands of the worker, the farmer, and the housewife.

Socialism came to England because the choice in 1945 was between monopoly or cartel and socialism, and the voters, faced with "Hobson's choice," chose socialism.

I ask American businessmen to cooperate in social legislation to see that it is soundly conceived and administered, and, in the process, to secure a top advisory position in the financial and fiscal affairs of our government which, in the final analysis, will be tremendously important in the years to come.

I urge the nation's business leaders to turn their productive abilities into means and methods of diffusing ownership and the benefits of capitalism among all of our people. In this I am not talking about sharing the wealth. I am talking about the creation of more wealth to share.

I like our system. It is the best system in the world today, but there is a constant room for improvement. It is a continuing never-ending job, and business men must find some means of spreading ownership, diffusing the benefit of democratic capitalism, and when we do so the threat of socialism in America will be further and further removed.

More widespread ownership of homes and other tangible utility goods will give the worker a greater sense of participation in his industry and the American system.

Workers Must Be Treated As Humans

HARRY A. BULLIS, Chairman of the Board, General Mills, Inc., speaking before Congress of American Industry

Management must apply itself with all the vigor it can command to the task of satisfying the complete wants of its personnel. These wants are psychological as well as material. Management must be quick to adapt its methods and its thinking to the changing wants of employees in this high-powered, highly industrialized civilization of ours.

Employees should not be treated merely as pickets in a fence. They must be accepted as associates who have self-respect and self-confidence. Each should be given an opportunity to advance if willing to pay the price in intelligent hard work.

The monotonous nature of much work in the modern mass production system puts it up to the employer to provide some recognition for his workers to give them real satisfaction in their jobs.

Teeth for Arizona's Right-to-Work Bill

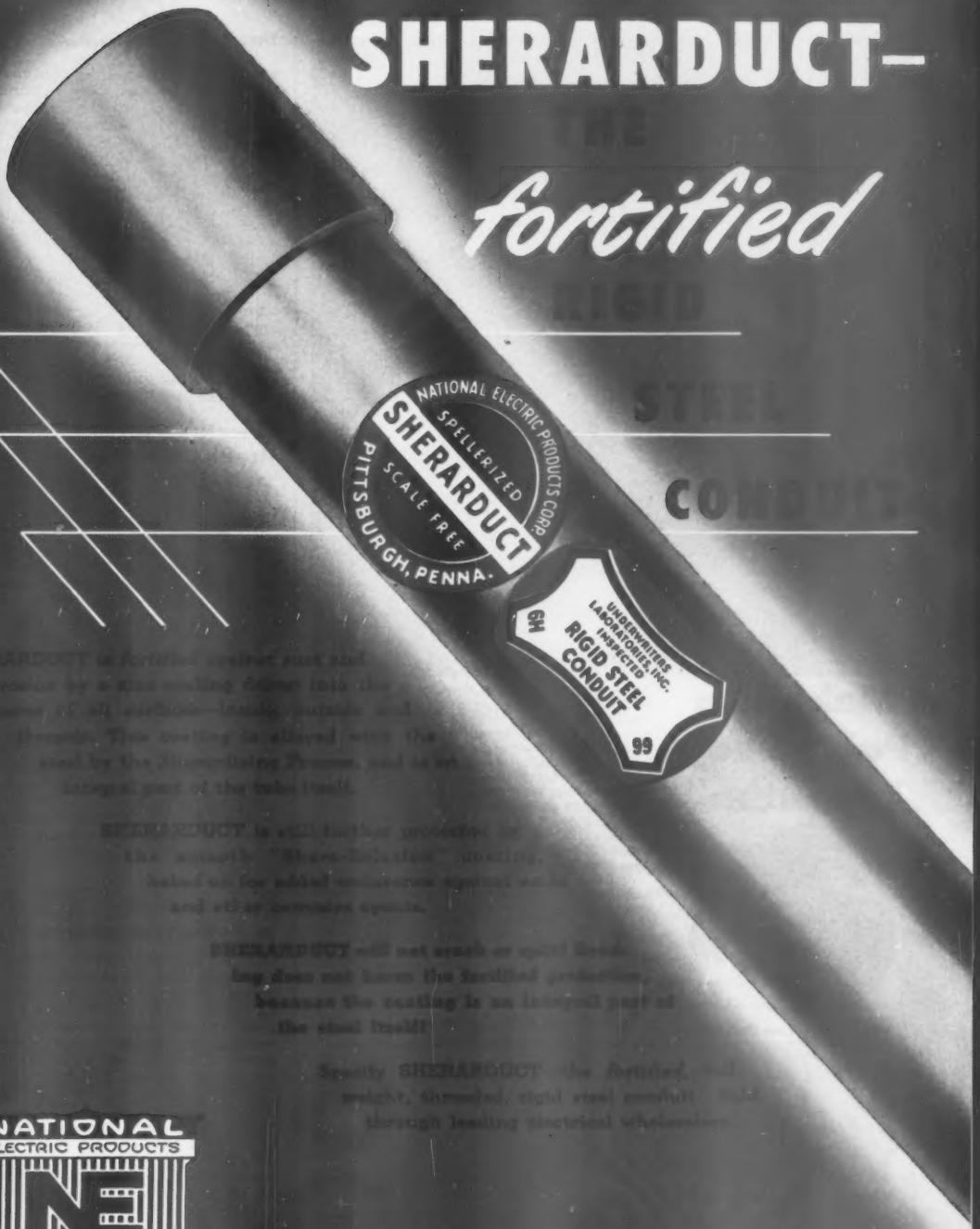
Enforcement "teeth" for Arizona's right to work bill were approved in a referendum measure in the state's general election by nearly a 2-to-1 margin.

The bill, approved as a constitutional amendment in 1946, provides that no one should be denied the right to work because he does not belong to a labor union and thus prohibits closed shop contracts.

The new enforcement measures

SHERARDUCT—

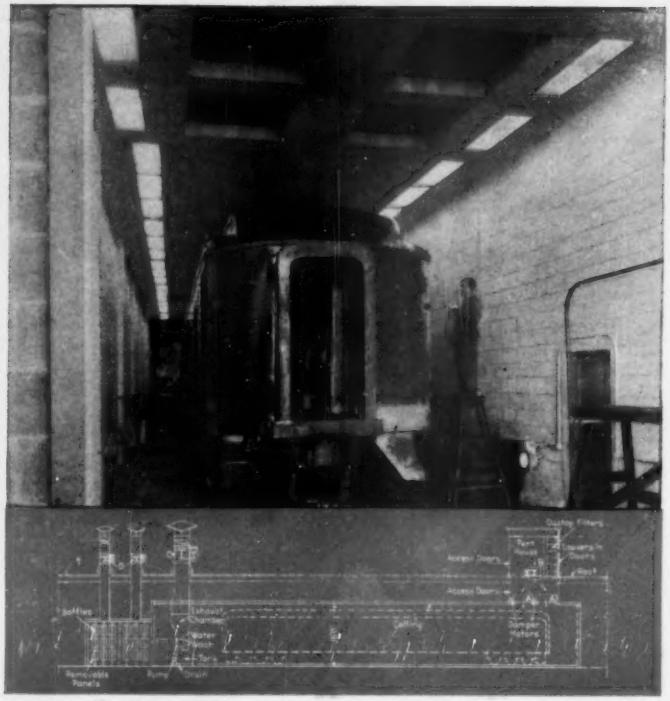
fortified



NATIONAL
ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

National Electric

PRODUCTS CORPORATION
PITTSBURGH 30, PA.



Making a Paint Shop "Breathe"

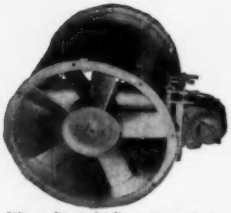
At the railroad car paint shops of the Central Railroad of New Jersey at Elizabethport, N. J., fresh air supply, and exhaust of contaminated air are accomplished by means of Wing Straight Line Duct Fans, while the temperature of the air is controlled by means of Wing Variable Temperature Heater Sections.

Two 7½ hp. Wing Straight Line Duct Fans, mounted in a penthouse at the open end of the paint spray shop, supply filtered fresh air at the rate of 45,000 cu. ft. per min. through 4 Wing Variable Temperature Heater Sections, which permit any temperature variation desired.

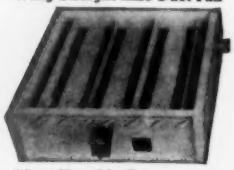
At the other end of the shop, the contaminated air is thoroughly washed by being drawn through a water curtain by two 15 hp. Wing Straight Line Duct Fans, installed in stacks above the roof, where it is exhausted to atmosphere.

Two 3 hp. Wing Straight Line Duct Fans are also installed in a small parts spray booth.

Reprint of an article describing this installation is available. Write for a copy today.



Wing Straight Line Duct Fan



Wing Variable Temperature Heater Section

L. J. Wing Mfg. Co. 162 W. 14th Street
New York 11, N. Y., Factories: Newark, N. J., Montreal, Can.

Wing

VENTILATING FANS

prohibit jurisdictional strikes, outlaw the closed shop, and authorize court injunctions in labor disputes if anyone is injured as the result of a strike.

The measure was bitterly fought by labor, which contended that the 18th Arizona legislature, in fashioning policing powers for the bill, went far beyond the intent of the people who approved the 1946 constitutional amendment.

Labor argued that the bill would serve to destroy the effectiveness of unions, depress wages, and generally hurt the economy of the state. Supporters waged their campaign on the theory that the restrictive measures were necessary to carry out the constitutional amendment.

Executives Given Health Check-Ups

Industry is paying increasing attention to the health of its executives, according to a study of company medical and health programs recently made by the National Industrial Conference Board. This is due, it was found, to the untimely death of many executives, young and old, and the growing need for qualified leaders.

The most popular schedule for executive personnel of cooperating companies in the survey was found to be the annual check-up. More frequent examinations, it was noted, are available when necessary. Executives of 16.5 per cent of the 333 establishments surveyed are required to undergo periodic physical examinations. Nearly a third of the companies, 30.9 per cent, provide examinations for those executives who wish to take advantage of this service.

Training Given in Battery Maintenance

A series of practical one-week schools to teach better techniques of storage battery maintenance and repair to foremen, supervisors, and engineers in the many industries that employ lead-acid batteries for motive power, standby, or direct-current supply, was inaugurated recently in Trenton, N. J., by Gould Storage Battery Corporation.

The 5-day course includes a series of lectures and laboratory projects, demonstrations, and written or oral examinations. Successful candidates receive diplomas upon graduation.

Training includes storage battery theory, battery design, electrical theory, battery layout, charging methods, maintenance procedure, evaluating secondary haulage, and handling batteries underground. Laboratory projects and demonstrations include assembling a complete cell and rebuilding battery, charging batteries

This Thermo-Blo air cooling unit attaches to Linotype machines for the cooling of hot type molds. Manufactured by Mergenthaler Linotype Company, Brooklyn, N.Y.

SIMPLIFIES INSTALLATION

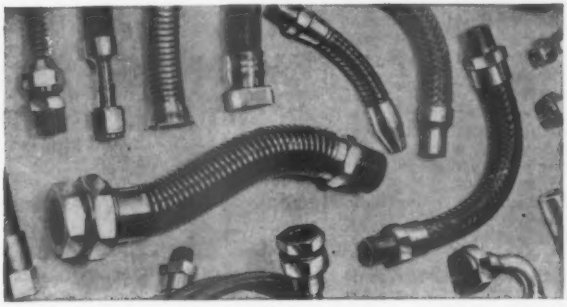
for this cooler of hot Linotype molds

The requirements indicated flexible metal hose: to carry up to 200 cubic feet of air a minute to hot Linotype molds . . . must be rugged, foolproof, quick to install . . . flexibility needed to counteract vibration, simplify alignment.

And American Flexible Metal Hose it was. For this particular application—the Mergenthaler Thermo-Blo air cooling unit for Linotype machines—American selected Type VAC Interlocked Flexible Steel Hose with asbestos-packed joints. The complete assembly is supplied with end fittings attached—designed by American from fitting to fitting at no extra cost.

SPECIAL DESIGN . . . NO CHARGE

Bring your connector problems to American. It doesn't matter whether they involve carrying water, steam, oil, other liquids, semi-solids, gases —or problems of misalignment, vibration, piping in cramped spaces, connecting moving parts. (You may even require a flexible connector of a special, rectangular shape.) An American flexible connector may be your answer. Remember, there's no charge for special design, and your connector can be furnished as a complete, ready to install assembly. Write for literature. 48208



ANACONDA

American

METAL HOSE

THE AMERICAN BRASS COMPANY

American Metal Hose Branch

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

Distributed in Canada by:

THE CANADIAN-FAIRBANKS MORSE COMPANY, LIMITED

When you need specific information on materials, equipment or services reach for your Sweet's File for the Mechanical Industries (the big black file). It contains 197 manufacturers' catalogs full of useful information on thousands of products . . . from abrasives to zeolite. Cross indexing speeds finding.

If Sweet's File for the Mechanical Industries is not available in your office, make request immediately for application form. Files are distributed FREE to qualified organizations and individuals.

Sweet's

CATALOG SERVICE

for easier, faster selection of products

119 W. 40th ST., NEW YORK 18, N. Y.

by different methods and setting up charging controls and schedules, repairing damaged batteries with proper tools and correct carbon-arc burning technique, and an inspection tour of Gould's battery manufacturing facilities.

Interested applicants should write to Gould in Trenton for particulars.

Profit Sharing Leads to Industrial Peace

ROY C. McKENNA, Chairman of the Board, Vanadium-Alloys Steel Company, Latrobe, Pa., speaking before Council of Profit Sharing Industries.

I am firmly convinced that profit sharing and welfare should be separate. Owners and management should recognize that bonuses earned by workers under profit sharing belong to the receiver to do with as he pleases. Any contribution toward sick benefits, savings plans, pensions, social activities, or insurance should be entirely voluntary. Many so-called profit sharing plans failed because management insisted upon using funds designated as profit sharing for the purpose of welfare. Experience has shown that many of our nation's costly and violent strikes have been in companies that have treated their employees most generously in regard to welfare.

Much of the good of profit sharing is intangible. If the adoption of profit sharing is to make rapid headway, we know it must prove that it pays its own way. The report of the Subcommittee of the United States Senate Committee on Finance, investigating profit sharing in industry, in 1938, found that almost without exception those companies that had in effect profit sharing plans of long duration were practically free from labor strife. The cost of industrial strikes against our national economy has been exceeded only by the cost of the wars that we have fought.

Under any system of economics or government there must be provided an incentive to increased production. No better incentive has been devised by man than that of the profit motive. Today there is a tendency on the part of those in political authority towards socialism, but no one dares openly to attack the profit motive. The profit motive is the heart of our industrial civilization. I do not doubt that extending the direct benefits of the profit of industry to several million American workers would do much to insure the continuance of orderly consitutional government. The worker furnishes the labor that keeps the wheels of industry turning; he and his family are the consumers of the goods produced by industry. He is the individual who holds the destiny of America in his hand when he goes to the ballot box.

One reason why profit sharing may be our way to industrial stability is economic, in that it directly increases

WHEELER

SELF-POWERED TELEPHONES

ABSOLUTE PROOF AGAINST SPARKS and FIRE HAZARD

CORROSION RESISTANT

No batteries or other power connections are used for voice transmission or bell. Transient noises are eliminated, leaving the voice clear and distinct. Operation cannot fail due to loss of power. Compact and convenient. Efficient up to 20 miles. Comparable in quality and size to standard telephone sets. Koiled Kord equipped for convenience and long service. See your jobber or write today for booklet SA-8.

THE WHEELER INSULATED WIRE CO., INC.

1701 EAST AURORA STREET

WATERBURY 91, CONNECTICUT

SERVICE QUALITY WHEELER DEPENDABILITY

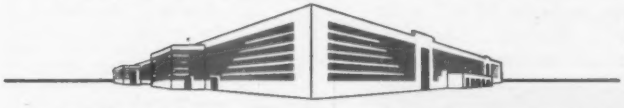
DIVISION OF THE SPERRY CORPORATION

MAGNET WIRE • COILS • BALLASTS

SIMONDS

This Line is made only in Top Quality

. . . and SOLD ONLY THROUGH TOP DISTRIBUTORS



BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 51 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

WORLD'S FIRST WINDOWLESS PLANT—HOME OF

SIMONDS
CUTTING TOOLS

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS — Special Electric Furnace Steels
SIMONDS ABRASIVE CO. — Grinding Wheels and Grains
SIMONDS CANADA SAW CO. LTD. — Simonds Products for Canada

FOR METAL, WOOD, PAPER, PLASTICS

Swivel Action Saves Hose Wear

with **ARO** SPEED COUPLERS

You get *swivel action* with Aro Speed Couplers . . . eliminates twisting and kinking of hose . . . prolongs hose life. Just "push on" to attach . . . "pull off" to detach. It's leakproof with a shut-off valve in Coupler which closes automatically when detached. No other valves necessary. Coupler cannot be accidentally detached.

FOR AIR, WATER AND STEAM LINES

These precision-built Aro Speed Couplers are available in a complete line for use on air lines, water lines and steam lines. Wide range of connector sizes includes 9/16" x 20 female thread (DeVilbiss). Simple . . . efficient . . . dependable. Ask your Aro Jobber or write . . . The Aro Equipment Corporation, Bryan, Ohio.

Use also for "Plug-In" Service

Specify **ARO** SPEED COUPLERS

ALSO

AIR TOOLS . . . LUBE EQUIPMENT . . . GREASE FITTINGS . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS

purchasing power without entering into price. It is not a charge against production. It is not a part of the vicious circle to which economists refer. It is a reward for increased production without increased cost, and it benefits everyone by giving more to divide among all of us.

Profit sharing is in accord with sound economics. It does not promise something for nothing. It pays its own way without seeking government aid. It has been successfully tested in large and small businesses in many diversified lines of manufacturing and merchandising.

To have assurance of real success, a profit sharing plan should be put into effect at a time of industrial peace, and it must have the support of a management sympathetic to the principle. The benefits of profit sharing to the company adopting it may not become apparent for several years, until it has been proved that the plan was put into effect in good faith and not for any ulterior motive.

Management should participate in profit sharing, and there is ample justification to weigh heavily the factor of responsibility of position. Any employee worthy of his hire has some responsibility. In fact, one of the benefits of profit sharing is that the employee accepts responsibility, and less supervision is necessary. As an employer of labor who has practiced profit sharing for over 25 years, I can state with confidence that many theoretical objections to profit sharing do not materialize in practice. In 1920, in a letter to one of my business associates, I stated:

"The primary concern of any employee is that he has a positive and definite minimum income upon which he must base his mode of living. Above this, every employee has a natural desire to participate to the extent which his services justify, in any unusual profits of a company.

"The prosperity of any company is due to a combination of reasons. It is not always due to good management, but is really more often due to trade conditions of an industry being favorable. In periods of prosperity even poorly managed companies make large profits. The employee has as much right to share in exceptional prosperity resulting from favorable trade conditions as has the stockholder."

Profit sharing does not lead to interference by employees in management. Employees recognize that stockholders are entitled to a generous return upon capital invested and, also, that those responsible for management are entitled to liberal compensation.

Any plan must fit into an organization that has adopted it. Generally, a fair and reasonable return should be allowed capital before any profits are divided. The percentage divided among employees should be

What's Interesting About UNION CHAIN'S Raw Materials?

Union Chains for Every Application

Drive and Conveying Chains and Sprockets

- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

★

Finished Steel Roller Chains and Sprockets

- All manufacturer's standard, size ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

★

Silent Chain and Sprockets

- All sizes ⅜ in. to 1½ in. pitch

★

Flexible Couplings

- Roller chain type
- Silent chain type

Sprocket chain is essentially an assembly of Sidebars, Bushings, Rollers and Pins, fabricated from Strips, Bars, and Rounds of steel.

Since UNION manufactures all types of steel sprocket chain for the transmission of power and the mechanical handling of materials and **nothing else**, the specifications of every lot of Steel which UNION buys, are determined only by the desire to build the greatest ultimate service into the particular chain part for which it is required. This circumstance should be interesting to UNION'S present and future customers.

The Union Chain and Manufacturing Company

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

Sandusky, Ohio, U.S.A.

WHAT'S *YOUR* HANDLING PROBLEM
16 oz. Bottles or 600 lb. Crates ?

A CONVEYOR SYSTEM ENGINEERED BY ALVEY--FERGUSON Will Speed Your Plant's Production!

WHICH TYPE of A-F Engineered Conveyor System is best for *your* plant? A-F Gravity . . . Belt . . . Live Roller . . . Apron . . . Chain . . . Portable . . . Trolley . . . Spiral Chutes . . . Vertical—a combination of two or more of these types—or one of the other types of conveyors engineered by A-F Engineers?

Only a study of your plant's operations can give you the answer to your problems of materials handling and products handling.

For more efficient production now—or for the future—we can help you as we have helped other plants.

Write today.

THE ALVEY-FERGUSON COMPANY
131 DISNEY STREET *Established 1901* CINCINNATI 9, OHIO
Offices or Representatives in Principal Cities — Coast to Coast.

CONVEYING EQUIPMENT
Alvey-Ferguson
METAL PRODUCTS CLEANING EQUIPMENT

sufficient to interest them and to bear a fair relationship to the capital savings earned. It should be given willingly, and with the full assurance that it is earned by the employee and is his to do with as he pleases.

Profit sharing is justified to stockholders by the decrease of costly labor disputes, and, in successful plans, the distribution to employees is earned directly by them without becoming a charge against production. The task of management is more pleasant, involving less supervision, and employees appreciate the absence of unnecessary regimentation and the additional independence and responsibility they assume. There is no sabotage under profit sharing.

Absenteeism Averages 9.6 Days Per Year

According to the Bureau of Labor Statistics, the average manufacturing worker was off his job 9.6 days last year. The Bureau gave the following breakdown as reason for absenteeism. Non-industrial sickness or accident, 6.5 days; personal, 2.5 days; work injuries, ½-day.

Percentage of Savings Goes to Employees

Instead of paying a uniform flat rate for ideas which save time and money, Armco Steel Corporation will now reimburse its workers for their suggestions on a percentage basis in accordance with the amount of money saved as a result of adoption of the proffered improvements. Gross savings by the company will be considered as the base for determining the size of the awards. Even the previous top limit of $2500 for a single suggestion may now be exceeded if the Armco management believes an idea to be exceptionally meritorious.

Industry Urged to Disperse for Security From Attack

GAYLE W. ARNOLD, Assistant Director of Production, National Security Resources Board, speaking before the Society of Industrial Realtors

There is urgent need for prompt dispersal of population and industry in the United States as a protective measure against a possible atomic attack.

Instead of learning a lesson from Hiroshima or Nagasaki, we are continuing to add to the size of our urban establishments on a tremendous scale and thus are providing even greater targets for possible aggressors.

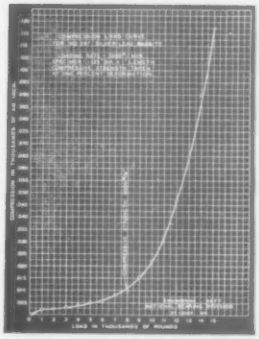
With 75 per cent of the country's facilities concentrated in 140 comparatively compact metropolitan areas, and 45 per cent of our 19 major centers, it is high time that

"Let's Specify N-B-M #397 SILVER BABBITT ...we'll get good service and save money!"

Yes, this engineer has found by experience that N-B-M #397 Silver Babbitt can be specified on all types of bearing applications that require long, dependable service ... *and at 30% to 40% less cost per pound than tin-base babbitt!*

N-B-M Silver Babbitt has all the necessary characteristics that spell trouble-free bearing application. It's easy to bond; embeds dirt and grit, even at room temperature; resists corrosion and squeezing out.

Find out more about money-saving, long-wearing N-B-M Silver Babbitt. Every product Designer or Plant Engineer should have a copy of the N-B-M Silver Babbitt folder, complete with physical characteristics and engineering briefs. Write for your copy today!



N-B-M ... Serving Industry with Better Products ... Better Service

AMERICAN COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

TOUGH TO BEAT!

KLEMP SURE FOOTED AS A CAT FLOORSTEEL THE FLEXIBLE FLOOR ARMOR THAT ROLLS OUT LIKE A RUG

WRITE FOR THIS BULLETIN

—for durability

—for ease in installing

Klemp FLOORSTEEL

The *flexible* floor armor that rolls out like a rug

Roll out this steel mesh over old or new floors, fill with concrete or mastic for an impact-proof, wear-resistant floor. Wheels ride on steel at all times. Also—Hexteel Heavy Duty Surface Armor, and Diamond Gratings.

WM. F. KLEMP CO.
6616 S. Melvina Avenue
Chicago 38, Ill.

American industry embarked upon a broad-scale program of dispersal for its own protection and for national security.

Such a step would be an important contribution to peace because it would put an enemy to prohibitive expense in destroying this country's ability to defend itself.

The current annual increase in population of the 140 metropolitan districts is equivalent to 15 cities of 50,000 population each. The United States would be much better off it it were building 15 dispersed cities of that size every year.

There is no practical reason for postponing a vigorous start on industrial dispersion in urban decentralization. There is a very practical reason for not postponing it. If we delay too long, we may wake up some morning and find that we haven't any country. That is, if we wake up at all that morning.

Recent findings of the NSRB indicate that industrial centers less than five square miles in size, or urban concentrations of less than 50,000 people, when separated by about ten miles of relatively open country, could be assumed to be relatively safe from attack.

Some progress has been made in this direction lately, but not enough for comfort. Since 1940, cities of 100,000 population or smaller have attracted 66 per cent of the new plants, with decentralization particularly notable in mechanical and electrical-appliance industries.

Employees to Receive Wage Dividend

Some 51,500 employees of Eastman Kodak Company in the Western hemisphere will share in a record wage dividend, estimated at $13,000,000.

Employees eligible for the wage dividend will receive $22.50 of each $1000 earned by Kodak during 1944 through 1948. Last year's wage dividend amounted to $11,600,000 for 49,300 employees in the hemisphere. The wage dividend plan has been in effect since 1912.

Liberalized Policy for Military Leaves

A new and highly liberalized policy on leaves of absence for military service or training has been put into effect by the Socony-Vacuum Oil Company, Inc. It became effective Sept. 1, 1948, and remains so until Dec. 31, 1949, after which it is subject to termination or revision.

During the first 30 days of military service, employees will continue to receive their regular wages or salaries with deductions of government pay and allowances and other deductions required by law. After this

OLD FAITHFUL

Quicker, Clearer MARKS on METAL

Made by crayon specialists, there's an Old Faithful Marker that's especially developed to do each job right.

METALMARK and HOTMARK
For hot metals

PAINTMARX
The "stick of paint"—permanent, weather-proof marker for all cold metals and other surfaces.

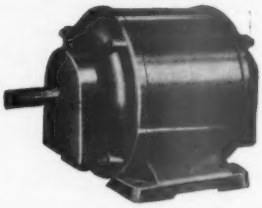
AMERICAN "5000"
General marker for rough and glazed surfaces in shipping room and plant.

Write for FREE catalog of Industrial Crayons. Complete line of reliable markers for every industry.

Dept. F-29
Ask for "OLD FAITHFUL" Markers

the AMERICAN CRAYON company Sandusky, Ohio

This MOTOR *is holding down thousands of* JOBS—



Because VALLEY Ball Bearing Motors are designed and built in a wide variety of sizes and types, they are highly adaptable to fit any power requirement. Check these VALLEY advantages—

- They take unusual power loads
- They are Drip proof... splash proof
- Economical
- Cool
- Ball Bearing

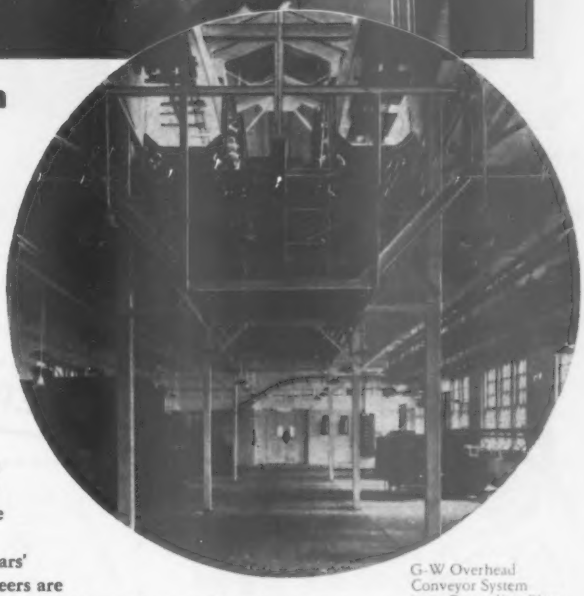
Look to VALLEY for dependable power Units.

Valley VALLEY ELECTRIC CORPORATION
4221 Forest Park Blvd. • St. Louis 8, Mo.

G-W Overhead Trolley in a Radiant Heat Tunnel

Relieve congested floor areas— put handling jobs on the ceiling

...with a G-W overhead trolley system



G-W Overhead Conveyor System in an Enameling Plant

Practical expansion of work areas without enlarging your plant is what you actually achieve when materials handling operations are put overhead. Gone are congested floor spaces with ever present production slow-ups and safety hazards. Efficiency, order, and lowered handling costs result.

Standard G-W conveyor units will handle most industrial operations for both work in process and finished products. Transportation of raw materials and parts, shifts from floor to floor, moves between operations—all can be coordinated in one G-W System.

With the acquired knowledge of over 130 years' experience in materials handling, G-W engineers are prepared to plan conveyor systems for any plant. Regardless of the type of equipment needed—apron, flight, chain, belt and screw conveyors, bucket carriers, and gravity or centrifugal discharge elevators—G-W can supply them all and will recommend the *right* combination for your plant.

GIFFORD-WOOD CO. • 420 LEXINGTON AVE., NEW YORK 17 • 565 W. WASHINGTON ST., CHICAGO 6
Factory: Hudson, N. Y.

HANDLING HEADQUARTERS:
for Industrial Conveying and Elevating . . . for Coal and Ash Handling . . . for Ice Handling . . . for Infra-Red Baking and Drying . . .

G-W HANDLES IT . . .
faster • easier • cheaper

GIFFORD-WOOD

SINCE 1814

4055

BUILD SAFER SCAFFOLDING

. . . for every industrial need

GOLD MEDAL SCAFFOLDING

You'll Get Best Results with

TUBELOX

Diagonal connection, adjustable coupler

Normal right angle connection

Standard base

Caster with brake for rolling tower

Only four simple basic parts are used. "TUBELOX" tubular steel scaffolding is the most flexible and economical for interior or exterior work—*for small scaffolds or large ones.* It can be erected and taken down in less time. With casters added, assemblies are converted to rolling towers. *Stores in minimum space.*

Tubelox is available in 6′, 8′, 10′ and other lengths.

Maintenance work in machine shop

Used in erection of Machinery

COMPLETE STOCKS FOR SALE OR LEASE

Manufacturers of

Tubelox Tubular Steel Scaffolding • Gold Medal Suspended Masons' Scaffolds • Swinging Scaffolds • Sidewalk Protection Canopies • Trouble-Saver Sectional Steel Scaffolding • Adjustable Trestles • Steel Scaffold Brackets • Safety Ladders

Write for Catalog and Complete Information

THE PATENT SCAFFOLDING CO., INC.

3821 11th Street, Long Island City 1, New York

BRANCH OFFICES: Atlanta • Boston • Chicago • Detroit • Kansas City, Mo. • Los Angeles • San Francisco • St. Louis • Milwaukee • Miami • Dallas • Philadelphia • Seattle • Pittsburgh

1. Connect wires to receptacle. Fits standard 4" or 3½" outlet box or plaster ring. Only tool needed is a screwdriver.

2. Screw hanger to outlet box—only two screws needed. No centering, no punching, no drilling.

3. Hang the fixture and just plug it in. That's all! Self-grounding—regular 2-wire cord and plug may be used.

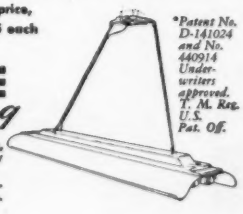
HYDEE HANGERS* REDUCE INSTALLATION TIME

Complete with receptacle, two 5-foot chains, "S" hooks and clips. Nothing else to buy.

List price, $1.65 each

IT'S EASY TO SEE WHEN IT'S

DAY-BRITE Lighting



*Patent No. D-141024 and No. 440914 Underwriters approved. T. M. Reg. U.S. Pat. Off.

Day-Brite Lighting, Inc., 5441 Bulwer Avenue, St. Louis 7, Missouri. Nationally distributed only through leading electrical wholesalers.

In Canada: address all inquiries to Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

THEY SAY AND DO *(continued)*

period, employees with dependents will receive 50 per cent of the regular wages or salaries with the same deductions.

Employees who are members of the company's insurance and annuity plans and their dependents will receive full coverage for the initial 30-day period, with employees' contributions toward the plan being deducted from regular salaries and wages.

After the first 30 days, group life insurance coverage will be continued, but the total and permanent disability and accidental death and dismemberment coverages will be discontinued until the employees return to active Socony-Vacuum service. Annuity coverage is suspended after the first 30 days, without further purchases of annuities, until the employees return to active service. The company will purchase the annuities for the intervening time. Employees' seniority and reinstatement rights are protected throughout the terms of military service.

The Socony-Vacuum plan applies equally to employees for whom service is mandatory, such as draftees and members of reserve units or the National Guard who are ordered into active duty, and to volunteers in the draft age who have enlisted for the minimum terms which are available.

Industrial Output Record in October

A new peacetime record in industrial production was achieved in October. It broke through the previous peak which stood for seven months.

The Federal Reserve Board reported that an upturn in output of durable goods sent the board's index of production up three points last month to a level of 95 per cent above—or nearly double—the 1935-39 average. The index is adjusted to normal seasonal fluctuations.

Three Nations Sign Standards Agreement

A new boost to industrial cooperation between the United States, Great Britain, and Canada came recently when the three nations signed an agreement for the standardization of screw threads.

The Bureau of Standards, Washington, primary sponsor of the agreement and site of the signing, emphasized the importance of interchangeability of machine parts which the pact will make possible.

The agreement provided basically that the British would give up the 55-degree angle on screw threads established on the Whitworth standard by that country in 1845. The agreement adopted the 60-degree angle known as the Cellers standard

NEW!

Weld Flux Chipper

CP-455-L with lever throttle and quick release retainer. Push type throttle handles available.

with a high velocity jet blow

This new CP-455 Pneumatic Chipper has a built-in high velocity air jet which cleans off the work surface as though a blow gun were built into the tool.

A new type of non-wearing "Pulley-valve" and throttle regulate the force of the blow from a tap to a heavy hammer-stroke, making the CP-455 an all-purpose scaler. Ideal for chipping weld flux, paint, rust, scale, soot and dirt, and a dozen other applications. Immediate delivery. Write for Bulletin SP-2089.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

AMBACO Continuous Baling will lift your waste material from the status of a loss incurring nuisance to that of profitable, salable merchandise. A prominent user reports, "This baler pays for itself every five years on the basis of *payroll savings alone.*"

A statement regarding the volume and nature of your waste material will promptly bring our recommendations.

ABC The AMERICAN BALER CO. 64 OHIO STREET BELLEVUE, OHIO

CONTINUOUS BALING • CONTINUOUS BALING

NOTICE HOW THOMAS "JOB-SUITS" THIS TRUCK

Made with many different STAKES, SHELVES, RACKS, BOXES and HANDLES

How Thomas men help you "Job-Suit" trucks for your particular purpose: (1) Chassis is selected first. Kind and weight of average load and floor conditions determine platform size and wheel gear. (2) The superstructure that will handle your loads most efficiently is then chosen. Thomas has over 1000 supers (handles, boxes, shelves, etc.) cataloged for easy selection. Thomas "Job-Suited" trucks cost no more but you get more out of them because—they suit your job. Catalog and prices on request.

THOMAS "JOB-SUITED" TRUCK

Series 3400 hardwood platform truck with round corners. Made in 10 sizes. Illustrated above with type A superstructure. Tubular steel push handle 40" above floor. Moulded-on rubber tired wheels, Hyatt bearings. Thomas makes many other types of 2 and 4 wheel trucks, casters and wheels. Write for catalog. *Representatives in principal cities.*

THOMAS TRUCK AND CASTER CO.

3313 MISSISSIPPI RIVER KEOKUK, IOWA

which has been used by the United States since 1864. The standardized screws will have the rounded root, however, of the British standard, instead of the flat American root. The crests of screws may be either rounded, as under the American practice, or flat, as the British manufacture them.

Aside from these primary agreements, the negotiators worked out hundreds of supplementary problems governing the angle and pitch of screw threads, the number to be turned per inch for various sizes and types of screws and bolts, and tolerances and allowances for specific categories among the thousands of forms, ranging from loose through medium, to close.

Employees Favor Plant Newspapers

More than two-thirds of General Electric Company's employees, by actual test, regard their plant newspapers as the most honest and reliable news sources on company operations and policies.

General Electric is making a continuing employee readership survey of plant newspapers. The survey so far has completed 2000 personal interviews with employees in ten plants on the effect plant newspapers have had on their opinion of the company.

Sixty-nine per cent of personnel interviewed said the plant newspaper is the most honest and reliable news source on company operations and policies. The remainder cited municipal newspapers, friends, supervisors, and labor publications among news sources they considered more reliable.

Plant newspapers are read carefully from cover to cover by 78 per cent of employees covered by the survey, with only 22 per cent merely glancing through them.

For more than a year General Electric has been using its 33 plant newspapers to familiarize employees with its plants and programs.

Pensioners Provided Hospital Benefits

An experimental insurance plan providing cost-free hospitalization benefits for certain eligible pensioners has been adopted by General Electric Company.

The plan, retroactive to September 15, will provide benefits for more than 7500 of the company's retired employees and will afford similar benefits for all other eligible employees retiring during the life of the plan.

A trust fund of $5,865,827 has been set up to carry out the plan. Benefits are limited to $250 for any one pensioner during his lifetime.

TRY US FIRST

—when you need steel

WHILE it is true that the demand for steel has reached a peace-time high, we are doing everything possible to obtain tonnages of the types of steel you need. So, for Stainless, High Strength or Alloy Steel, Hot Rolled or Cold Finished Bars, Structural Shapes, Plates and Sheets, your best bet is to "Try Us First." Remember, too, that we are distributors of Metal-Working Tools, Supplies and Machinery. Just telephone, wire or write our warehouse nearest you. *We welcome your inquiries for literature covering Stainless, Alloy and High Strength Steels. There's no obligation.*

TURN IN YOUR SCRAP · The more scrap — the more steel

UNITED STATES STEEL SUPPLY COMPANY · USS STEELS · SERVICE

Symbol of Service for Steel Users

United States Steel Supply Company
Dept. L-19, 208 S. La Salle St., Chicago 4, Ill.

Without obligation on our part, please send us free booklets on U·S·S Steels.

☐ Stainless ☐ Alloy ☐ High Strength

Name..... Title.....

Firm Name.....

Address.....

City..... Zone..... State.....

UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO
CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH
PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

USS

UNITED STATES STEEL

MORE *Helpful* IDEAS THAN EVER—*at the...*

Under Auspices of American Society of Heating & Ventilating Engineers.

The better informed you are on newest equipment—latest advances and trends—the more expertly you can plan and apply efficient, economical installations for heating, ventilating and air conditioning all types of industrial plants. You'll get more helpful information, more profitable ideas here than in any comparable way or time.

Plant owners, managers, superintendents, operators, architects and engineers concerned with the application and maintenance of these vital services in any branch of industry can't afford to miss this great opportunity to supplement their working knowledge—to revitalize thinking . . . to stay progressive. Note the date . . . plan now to attend . . . it will be time well spent.

Management International Exposition Company

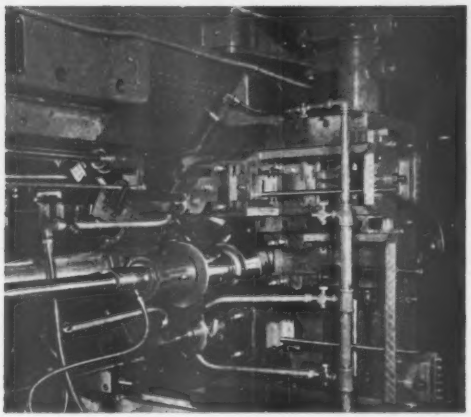
BEHIND THE BYLINE

Facts About *Factory's* Authors

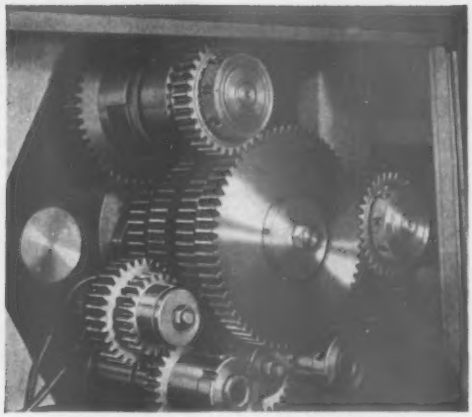
M. L. Wurman (page 119) began working in the cigar industry when he was only fifteen. By the time he was twenty, he had become the superintendent of a large cigar manufacturing plant, and for several years traveled among various plants helping them solve special manufacturing problems. He became associated with Bayuk Cigars, Inc., in 1928, was promoted to general superintendent of the plant in 1941, and became vice president and member of the board of directors in 1947. During the war he served as a panel member of the Regional War Labor Board. He is a past president of the Philadelphia Chapter of the American Society of Safety Engineers.

Walter A. Strauss (page 128) was graduated from Technical University, Zurich, Switzerland, in 1934, and came to this country two years later. Until 1941 he was associated with Princeton Worsted Mills, where he installed production and inventory control systems and did time study and methods work. He later became affiliated with the Mergenthaler Linotype Company as methods and time study engineer, at the same time completing his work for a master's degree in administrative engineering at New York University. He joined the staff of Air Reduction Sales in 1946 as an industrial engineer. His chief hobby at present: Working toward his Ph.D. in industrial engineering at Columbia University.

C. B. Muir (page 138) joined the Canadian General Electric Company in June, 1931, after receiving his B.S. in mechanical engineering from Nova Scotia Technical College in Halifax. He started in the mechanical section of this company, then transferred to the wire and cable department, where he was later made general superintendent. He is now supervisor of the plant engineering section. A member of the Engineer-



Full Swing for Main and Auxiliary End Slide Standard and Special Tool Mountings



Cone "Full-Choice" Open End Attachment Drive

IS HALF A LOAF BETTER THAN ONE?

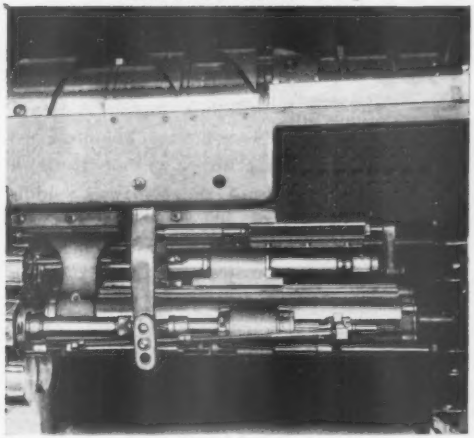
Machine capacity can usually be measured by tooling accommodation. The facility available to handle the job will determine a machine's dollar value.

Lack of a "full choice" accommodation of tooling positions for endworking tools and attachments can be a costly handicap to a multiple spindle automatic. The inability to swing to full collet capacity die heads, hollow mills, trepans, and internal necking tools, can limit a machine's usefulness on many jobs from zero up. Like half a loaf — better than none, but much less than one.

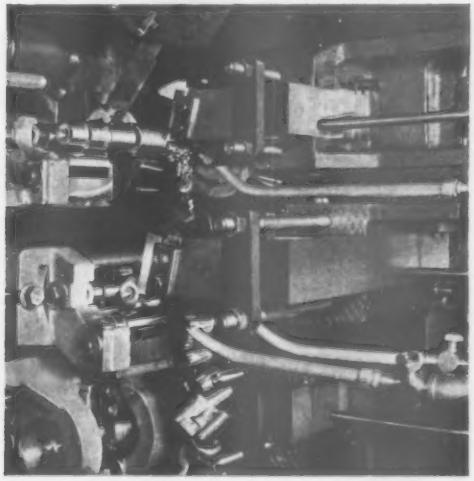
The "full choice" tooling accommodation of Conomatic cross slides, main end slides, auxiliary end slides and endworking attachment drive positions, are worth checking.

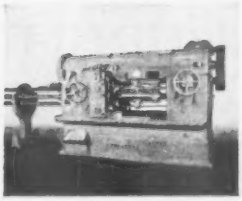
Write to Cone for Buyer's Chart which lists overall requirements of Multiple Spindle Automatics.

"All-Position" End Attachment Mounting



Standard Forming Slide and Auxiliary Cross Slide Facility





A comparison with ALL Automatics will lead you to

#6

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

When you need specific information on materials, equipment or services, reach for your Sweet's File for the Process Industries (the big gray file). It contains 212 manufacturers' catalogs full of useful information on thousands of products . . . from absorbers—gas, to wood preservatives. Cross indexing speeds finding.

If Sweet's File for the Process Industries is not available in your office, make request immediately for application form. Files are distributed FREE to qualified organizations and individuals.

Sweet's

CATALOG SERVICE

for easier, faster selection of products

119 W. 40th ST., NEW YORK 18, N. Y.

BEHIND THE BYLINE ***(continued)***

ing Institute of Canada since 1931, he also belongs to the Association of Professional Engineers. His hobbies include skiing, fishing, and carpentry in his home workshop.

(Received too late for inclusion in the December issue)

M. A. Hourigan, whose article "Incentives Halve Repair Bills for Defective Parts" appeared on page 123 of the December, 1948, issue, started his work in industrial engineering at the Chevrolet Gear and Axle Works in Detroit. The day before Pearl Harbor he started work at Bendix Aircraft in Wayne, Mich. His interest in incentives for indirect labor began during his next job on the industrial engineering staff of Eastman Kodak Company. After four years with this firm, he left to manage a box company, and later joined the industrial engineering staff of Ritter Company, where he resumed his work on incentives. He is a member of the Society of Time and Motion Study Engineers. He says that his principal hobby is photographing his four children—when he can get them to stand still.

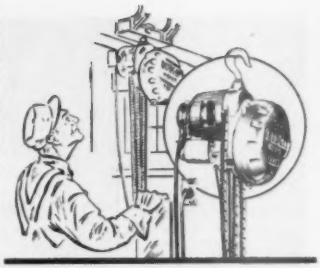
Factory Management and Maintenance is a consolidation of *Factory and Industrial Management* and *Maintenance Engineering.*

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: *The Engineering Magazine; Industrial Management; Factory, the Magazine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.*

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following publications: *Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.*

In addition, features of the publication *Timely Ideas* have been added.

All rights in the above names are reserved by the publisher.



Double savings!

Costs go down, production and profits go up when you install a portable 'Budgit' Electric Hoist to do your lifting for you. The fast, easy lifting action of a 'Budgit' Hoist makes it possible for your workers on production, assembly, and inspection lines to turn their energy into increased production once they're free from the drudgery and danger of manual lifting. That's how operating costs go down, compensation expenses decrease, profits rise — double savings!

There's another advantage to installing 'Budgit' Hoists to do your lifting. Being a complete lifting unit in itself, a 'Budgit' Hoist needs no additional equipment nor is there any installation expense connected to a 'Budgit.' You simply hang it up, plug into the nearest electric socket, and use!

Made in sizes to lift 250, 500, 1000, 2000 and 4000 lbs. Prices start at $119. Write for Bulletin No. 371.

MAXWELL MANNING MOORE TRADE MARK

'BUDGIT' *Hoists*

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of Ashcroft Gauges, Hancock Valves, Consolidated Safety and Relief Valves and 'American' industrial instruments.

CUT COSTS WITH SKIL Tools

For top production . . . at lowest costs . . . get SKIL Tools! They're packed with fast-working power . . . built with long-lasting stamina. Ask your Distributor to demonstrate SKIL Tools today!

SKIL Drills

A size and type for every job from lightest production drilling to heaviest boring, reaming and hole-cutting. 33 powerful models.

SKIL Belt Sanders

Speed all surfacing on flat surfaces of wood, steel and compositions. Belt widths from 2 ¼ to 4 ½ inches. 4 powerful models.

SKIL Bench Grinders

Completely new line of powerful, fast-working grinders to boost production grinding, sharpening, wire-brushing and buffing. 4 models.

SKIL Tools

THOR'S GREAT NEW

THE MOST POWERFUL 3/8" ELECTRIC IMPACT WRENCH EVER BUILT!

COMBINING TWO PROVED FEATURES!

The powerful, durable striking mechanism—of the same type so widely preferred in Thor *pneumatic* impact wrenches.

The famous Thor heavy duty electric motor . . . standard in Thor electric tools for 35 years.

See your Thor Distributor or Jobber today, or write for Circular No. 1025

INDEPENDENT PNEUMATIC TOOL COMPANY

Aurora, Illinois

Export Division: 330 West 42nd St., New York 18, N.Y.

Birmingham · Boston · Buffalo · Chicago · Cincinnati · Cleveland · Denver · Detroit · Houston
Los Angeles · Milwaukee · New York · Philadelphia · Pittsburgh · St. Louis · St. Paul
Salt Lake City · Seattle · San Francisco · Toronto, Canada · Sao Paulo, Brazil · London, England

"PACKY"

A 1-2 PUNCH THAT DELIVERS EFFICIENCY FOR

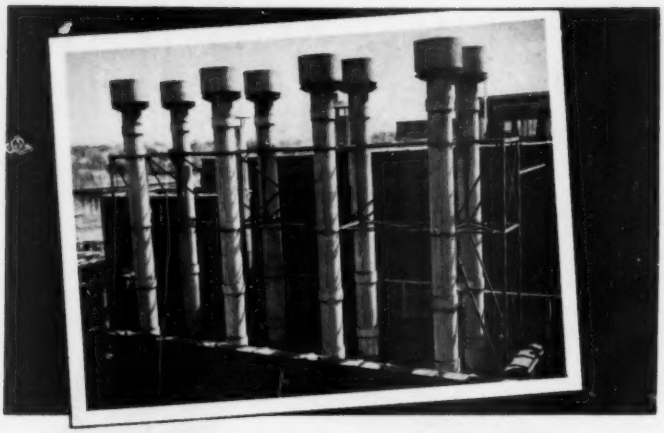
NUT SETTING • SCREWDRIVING • DRILLING IN STEEL, WOOD, MASONRY • TAPPING REAMING • HOLE SAWING • SANDING

The complete versatility of this great new Thor tool makes it a "must" for every production line, factory maintenance, garages, engine rebuilding shops . . . *wherever* power can get jobs done cheaper—faster!

LEADER OF THE NEW THOR *Silver Line* ELECTRIC TOOLS

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



Records show long service in tough service . . .
for Transite Industrial Vent Pipe

In installations in many industries where corrosive fumes, vapors, dusts, and gases are encountered, Transite Industrial Vent Pipe is yearly demonstrating the fact that it is a practical, economical answer to tough venting problems.

Workable: Transite can be cut and drilled on the job.

Because it is an asbestos-cement product, this strong, durable pipe stands up in many types of corrosive service . . . helps avoid costly replacement . . . results in important reductions in plant maintenance.

Easily installed—Transite Industrial Vent Pipe has many practical installation advantages. It is light in weight and easily handled. It is readily worked and can be quickly cut and drilled on the job with ordinary tools.

Easily adapted—Made in a range of sizes up to 36" in diameter, Transite Industrial Vent Pipe is readily adapted to use as vents, ducts, and stacks. A full line of Transite fittings provides a venting system that is corrosion resistant throughout.

Adaptable: A complete line of Transite fittings meets most job requirements.

Economical to maintain—Transite is completely rustproof...highly weather resistant . . . needs no painting . . . resists corrosion outside, inside and all the way through. For full details about Transite Industrial Vent Pipe, write Johns-Manville, Box 290, New York 16, N. Y.

Johns-Manville
TRANSITE Industrial Vent PIPE

BOOKS

Production Control

LAWRENCE L. BETHEL, Ph.D., **WALTER L. TANN, FRANKLIN S. ATWATER**, and **EDWARD E. RUNG**. McGraw-Hill Book Co., 330 West 42nd St., New York 18. 2nd edition. 289 pages. Photographs; tables; charts; specimen forms; appendixes A, B, C; index. $3.50.

Completely revised, this second edition considers production control as part of an integrated series of controls. The authors emphasize the specific functions of production control. Other related controls, including production design, methods, quality, and procurement are discussed to show the current trend of interrelationship. Case problems are used to illustrate the principles as they apply to industrial situations.

Personnel Management For Supervisors

CLAUDE EDWARD THOMPSON, Ph.D., Professor of Business and Industrial Psychology and Director of Personnel Services, University of Omaha. Prentice-Hall, Inc., 70 Fifth Ave., New York 11. 192 pages. Specimen forms; reports; tables; references; index. $9.95.

Another in the "Industrial Relations and Personnel" series, this book emphasizes problems of personal as well as personnel relationships that confront supervisory management every day. Specific examples of effective as compared with ineffective practices and proceedings illustrate the text.

Beyond Collective Bargaining

ALEXANDER R. HERON. Stanford University Press, Stanford, Calif. 214 pages. $2.75.

After defining the term collective bargaining and considering its scope, the author discusses its importance in labor-management relations. He believes that to be effective it should be limited, as many problems are more satisfactorily handled without the formality of written agreements. He points out that it is management's responsibility to take the initiative in meeting such situations and discusses methods found effective in industry today.

Design of Industrial Exhaust Systems

JOHN L. ALDEN, ASME. The Industrial Press, 148 Lafayette St., New York 13. 252 pages. Diagrams, sketches, graphs, charts, tables, index. $3.50.

How to design, build, or choose the most effective model when buy-

12~~11~~ REASONS

for using HARPER Everlasting Fastenings

—ONLY 1 REASON FOR USING COMMON STEEL!

—An amazing combination of advantages in favor of non-ferrous and stainless steel bolts, nuts, screws, washers, rivets and accessories.

PROMPT SHIPMENTS FROM STOCK

Harper maintains stocks of over 5,000 individual items in Chicago and New York . . . large quantities of each. Others being added constantly. Specials made to order from ample stocks of raw materials.

HARPER

Write for Catalog

THE H. M. HARPER COMPANY

MORTON GROVE, ILLINOIS (Suburb of Chicago)
NEW YORK 13 • 200 HUDSON STREET

BRANCH OFFICES: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Los Angeles, Milwaukee, Philadelphia, St. Louis, San Francisco, Seattle, Toronto (Canada).

Every shop needs a

SHOPLIFTER

● One man can safely handle heavy loads up to 500 pounds with the aid of an Economy SHOPLIFTER. It's the ideal lifter for handling dies and heavy shop equipment, for use as an adjustable work table, loading street trucks, stacking drums, boxes and many other products.

The SHOPLIFTER is made as compact as possible so that it can be used where space is at a premium. Clears ordinary doorways with ease, can be taken down narrow aisles and along side other machinery. Shop men like the Economy SHOPLIFTER because back-breaking manual lifting is eliminated, accidents are greatly reduced, and valuable production time is saved.

24 inch square steel plate platform has lift of 54 inches above floor. Overall height 72 inches, capacity 500 pounds. Price of complete machine $157.50 f.o.b. Chicago freight prepaid anywhere in the U.S. Foot operated floor lock $10.00 extra. Heavier lifter models also available, capacities up to 5000 pounds.

Write for details

ECONOMY ENGINEERING COMPANY
4513 W. Lake Street
CHICAGO 24, ILLINOIS

ing an exhaust system for removing dust, fumes, shavings, and similar air-borne hazards to health. The book covers exhaust ventilation, low-pressure pneumatic conveying, the design of hoods, piping and structural details, and the selection of dust separators, centrifugal, and axial-flow exhaust fans.

Government Regulation of Industrial Relations

GEORGE W. TAYLOR, Professor of Industry, Wharton School of Finance and Commerce, University of Pennsylvania. Prentice-Hall, Inc., 70 Fifth Ave., New York 11. 383 pages. Index. $5.35.

One of the "Industrial Relations and Personnel" series, this book discusses collective bargaining as a constructive social institution. It sketches its history from the National Labor Relations Act of 1935 to the Labor - Management Relations Act of 1947. The war years are discussed, as well as the problems brought about by reconversion. The pros and cons of government regulation are considered, as compared with industrial self-government.

BOOKLETS

WHY—AND HOW—TO CONDUCT A MANAGEMENT AUDIT. A Program for American Opportunity. Robert M. Creaghead, President, Robert M. Creaghead & Co. Chamber of Commerce of the U. S., Washington 6, D. C. 12 pages. 5¢.

ECONOMIC SYSTEMS: Free Enterprise, Communism, Socialism, Hybrids; Regulations Compatible with Private Enterprise. Harold G. Moulton. The Brookings Institution, Washington, D. C. 55 pages. 50¢

COMPANY-WIDE UNDERSTANDING OF INDUSTRIAL RELATIONS POLICIES. A Study in Communications. Helen Baker, Associate Director, Industrial Relations Section. Department of Economics and Social Institutions, Princeton University, Princeton, N. J. 80 pages. Tables, selected references. $2.

BUYING WITH HOURS. The Economic Facts of Life series. Merle D. Schmid, President, Society for Advancement of Management, Chicago. Industrial Management Engineers, 111 West Jackson Blvd., Chicago 4. 24 pages. Poster charts, tables. 60¢.

COLLECTIVE BARGAINING IN THE PACIFIC COAST PULP AND PAPER INDUSTRY. Clark Kerr and Roger Randall. Industry-Wide Collective Bargaining Series, Labor

HYDRANTS, VALVES

Write for Catalog No. 34

CHECK VALVE GATE VALVE

OTHER M & H PRODUCTS

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
B & S Fittings
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes
Flanged Fittings

M & H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

"There isn't any doubt in my mind . . . this (the second edition) is the very best book . . . on the market today on Time and Motion Study."
—L. B. Persing, Supervisor of Wage Rates, General Electric Co., Fort Wayne, Indiana

NOW — The New Third Edition of

MOTION and TIME STUDY

By RALPH M. BARNES

. . . presents the latest time and motion saving methods for increasing worker output. In five new chapters, the author discusses process analysis, gang process charts, activity charts, and man and machine charts. He explains how to set up a work methods training program, and also includes a time study manual to aid in teaching time study procedures to foremen and supervisors.

January 1949
560 pages
345 illus.
$5.00

ON APPROVAL COUPON

JOHN WILEY & SONS, INC. FM-1-49
440 Fourth Ave., New York 16, N. Y.

Please send me, on 10 days' approval, a copy of Barnes' MOTION AND TIME STUDY. If I decide to keep the book, I will remit $5.00 plus postage; otherwise, I will return the book postpaid.

Name .....
Address .....
City ..... Zone ..... State .....
Employed by .....
(Offer not valid outside U.S.)

$795.00

Complete with 5 H.P. 3-phase or 3 H.P. Single Phase Motor and Switch f.o.b. Leetonia, Ohio

Price subject to change without notice

LOOK!

You get the capacity of a 16" saw . . . in this big, new DELTA® 12" Tilting-Arbor Saw

Versatile—handles a great variety of jobs in your production department, maintenance shop and other departments:

- Straight ripping
- Cut-off work
- Compound angular cutting
- Grooving
- Dadoing
- Mouldings
- Angular cutting
- Rabbeting

Yes, this heavy-duty saw pays its way on many of your operations. But it gives you more than versatility alone:

This 12" saw provides the kind of advanced engineering features that machine-tool users have come to expect from Delta. The panel at the left shows just a few of them.

Because of Delta features like these, your production and maintenance expense is lower. Your operator saws more accurately — and does it faster. And he is protected by the latest safety devices.

Your nearby Delta distributor has a Delta 12" Tilting-Arbor Saw on his display floor. Inspect this big-capacity machine there now.

Send coupon for descriptive Bulletin No. AD-448.

(This machine also available through Crescent Division dealers.)

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

DELTA MILWAUKEE®

Built for safety, accuracy, economy, and convenience!

- ✓ Finish-ground table is 3'2" x 4'. There's plenty of room in front of the blade — full 16 inches at maximum cutting capacity.
- ✓ Scale magnifier lens makes it easy to set rip fence accurately and quickly.
- ✓ Massive aluminum rip fence with Micro Set Pinion, simultaneous front and rear clamp.
- ✓ T-slots on either side of saw blade hold miter gage securely, even beyond front of table. Miter gage cannot twist or fall out.
- ✓ "Auto-Set" Miter Gage has individually-adjustable index stops.
- ✓ "Super-Safe" Blade Guard has basket that pivots with work so that blade remains covered but view is unimpaired. Guard tilts with blade.
- ✓ Welded steel cabinet encloses working parts.
- ✓ Saw arbor is carried on lubricated-for-life ball bearings.
- ✓ Motor mounting takes either Standard Delta or NEMA frame motor.

Look for the name of your Delta Distributor under "Tools" in the classified section of your telephone directory.

TEAR OUT COUPON AND MAIL TODAY!

DELTA MANUFACTURING DIVISION
618A E. Vienna Ave., Milwaukee 1, Wis.

Please send me free Bulletin No. AD-448 describing the Delta 12" Tilting-Arbor Saw.

Name.....
Title.....
Company.....
Address.....
City.....(.....) State.....

WM-24

MILFORD

WAVY SET BAND SAW BLADES

are setting new cutting records especially on horizontal band saw machines everywhere!

Users tell us . . . these Wavy Set blades are cutting better than 30% more metal . . . 50% more they say, on stainless steel . . . than any standard raker set blade. And cutting at closer tolerances!

Why? Just three major reasons tell the story . . .

Individually packed in cartons for easy handling.

FIRST . . . the teeth are set into the back of the saw, which means added strength . . . and practically no tooth rippage.

SECONDLY . . . the wave helps clear the chips from the cutting area . . . resulting in straighter cutting and material increase in blade life.

THIRD . . . made by saw specialists . . . the originators of the WAVY SET BLADE . . . who have incorporated new principles in basic design and heat treatment.

Order from your Mill Supply Distributor. He is always ready to serve your needs for all industrial supplies, including MILFORD hack saw and band saw blades.

You owe it to yourself to test a Wavy Set blade on your own machine . . . right away.

MILFORD
PROFILE AND BAND SAW BLADES
RESISTOR AND DUPLEX HACK SAW BLADES

THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for over 70 Years
NEW HAVEN 5, CONNECTICUT, U. S. A.

Relations Council, Wharton School of Finance and Commerce. University of Pennsylvania Press, Philadelphia. 32 pages. 75¢.

INDUSTRY-WIDE BARGAINING. Leo Wolman. The Foundation for Economic Education, Irvington-On-Hudson, N. Y. 63 pages. Tables. 50¢.

ON THE CALENDAR

JANUARY

10-14, Materials Handling Institute, 3rd National Exposition; Convention Hall, Philadelphia. Clapp & Poliak, Inc., Managers, 37 Wall St., New York.

10-14, Society of Automotive Engineers, Annual Meeting; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

13, American Supply and Machinery Manufacturers' Association, Inc., Industrial Distribution Forum; Edgewater Gulf Hotel, Biloxi, Miss. J. J. DeMario, Raybestos-Manhattan, Inc., Passaic, N. J.

19-21, Society of Plastics Engineers, Inc., Annual National Technical Conference; Hotel Bellevue-Stratford, Philadelphia. J. H. DuBois, Shore Insulator Co., Irvington, N. J.

20-21, American Management Association, Finance Meeting; Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

20-22, The Society for the Advancement of Management, Conference on Industrial Reconversion; Sheraton Hotel, Chicago. Carl S. Coler, Executive Director, 84 William St., New York.

24-28, American Society of Heating and Ventilating Engineers, Annual Meeting; Hotel Stevens, Chicago. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

24-28, Ninth International Heating and Ventilating Exposition; International Amphitheater, Chicago. Charles F. Roth, Manager, 480 Lexington Ave., New York 17.

31-Feb. 4, American Institute of Electrical Engineers, Winter General Meeting; Hotel Pennsylvania, New York. H. H. Henline, Secretary, 29 West 39th St., New York.

FEBRUARY

4-6, Refrigeration Equipment Manufacturers' Association, First Southern Refrigeration and Air Condi-

BRAND N[redacted] Press

THIS BOOK :-

TELLS YOU HOW TO DESIGN

THESE PARTS :-

AS IMPACT EXTRUSIONS...

to cut cost • speed assembly • improve products!

Write for your copy to:

ALUMINUM COMPANY OF AMERICA
2126 Gulf Building • Pittsburgh 19, Penna.
Sales offices in 55 leading cities.

ALCOA ALUMINUM

Which of these books will be most profitable to you?

HOW TO BECOME A BETTER SUPERVISOR

Improved Foremanship

Here is the specific, down-to-earth information that can help you most toward success. In good plain "shop talk" this book tells you exactly how all the different aspects of a production supervisor's work can be handled to best advantage—how, for instance, to train a new worker, settle a grievance problem, win the confidence of a difficult boss, get the best cooperation from other departments, gain the liking and respect of your workers and superiors alike, keep your production up, complaints down. "As readable as a good novel," says one foreman, ". . . and there is hardly a sentence that does not carry an important point."

1000 PRODUCTION AIDS

Illustrated Jig-Tooling Dictionary

988 working drawings, with concise explanations, show you at a glance what you want to know about the design, construction and use of any piece of tooling equipment. Here is a wealth of useful, up-to-date data not only on jigs and fixtures but also on dies, welding, plastic molding, machine tools and allied tools and procedures.

HOW TO GET YOUR GOOD IDEAS INTO PRODUCTION

Simplified Punch & Diemaking

Two expert toolmakers give you the best, most practical information on methods and materials for the design and construction of all types of punches and dies for fabricating sheet metal. One tool and diemaker of 30 years' experience wrote that he found this book so informative and so interesting that he sat up nights reading it! Full reference tables included.

See Them on Approval

The Macmillan Co., 60 Fifth Ave., N.Y. 11

Please send me on 10 days' approval a copy of each of the books checked below.

- ☐ **Improved Foremanship ($3.50)**
- ☐ **Illustrated Jig-Tooling Dictionary ($7.50)**
- ☐ **Simplified Punch & Diemaking ($5.00)**

Signed .....

Address .....

Company ..... B

tioning Educational Conference and Exhibit; City Auditorium, Birmingham, Alabama. H. F. Hildreth, President, 1346 Connecticut Ave., N. W., Washington 6, D. C.

14-16, American Management Association, Personnel Conference; Drake Hotel, Chicago. James O. Rice, Manager, 330 West 42nd St., New York 18.

28-Mar. 4, American Society for Testing Materials, Spring Meeting; Edgewater Beach Hotel, Chicago. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

MARCH

3-5, American Society of Training Directors, 5th Annual Meeting; Hotel Carter, Cleveland. F. S. Laffer, General Chairman, Graphite Bronze Co., 17000 St. Clair Ave., Cleveland.

3-10, The Society of Automotive Engineers, Production Clinics; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

10-12, American Society of Tool Engineers, Annual Meeting; Hotel William Penn, Pittsburgh. Harry E. Conrad, Executive Secretary, 10700 Puritan Ave., Detroit 21.

13-18, National Electrical Manufacturers' Association, Spring Meeting; Edgewater Beach Hotel, Chicago. R. J. Blais, Convention Manager, 155 East 44th St., New York.

17-18, American Management Association, Conference on Marketing; Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

24-25, Industrial Relations Center, 7th Annual Institute; University of Minnesota, Minneapolis. Herbert G. Heneman, Jr., Chairman, Industrial Relations Center, Minneapolis 14.

27-April 1, American Chemical Society, Spring Meeting; Fairmont Hotel, San Francisco. Alden H. Emery, Secretary, 1155 Sixteenth St., N. W., Washington, D. C.

29-April 1, International Lighting Exposition, 3rd International Exposition and Conference; Stevens Hotel, Chicago. B. F. Stevens, 326 West Madison St., Chicago 6.

29-April 1, Safety Engineers, Annual Convention; Hotel Pennsylvania, New York. Paul F. Stricker, Executive Vice-President, Greater N. Y. Safety Council, 60 East 42nd St., New York 17.

APRIL

2-8, American Association of Industrial Physicians and Surgeons,

MIPRO WALL TYPE SANITARY NAPKIN DISPOSAL

JANITORS-MATRONS

WHY DO UNPLEASANT TASKS . . . BE MODERN . . .

TRY THIS

Mipro Disposal eliminates all unpleasant features of Standard Soiled Sanitary Napkin receptacles.

Liner protects metal container and keeps it clean. Simply open bottom trap door and used liner and contents drop out into collection basket.

HANDS NEVER TOUCH USED LINER

WRITE FOR FULL INFORMATION TO

MIERSON PRODUCTS CO.
951 Howard Street San Francisco, California

IMMEDIATE DELIVERY

Model AR

You can depend upon Redington to make immediate delivery of these sturdy, 100% accurate Counters—"Watchdogs of Production." In models to fit punch presses, pumps, screw machines, packaging machines . . . conveyor lines, can making and box making machinery . . . in fact, all types of machinery and production lines. Easy to install. Write for Catalog.

F. B. REDINGTON CO.

105 So. Sangamon St., Chicago 7, Illinois

There Go 3269 Fasteners!

Tonight's test is tough . . . Doc Smith must get through . . . he's depending on the miracle of American mass production and (unknowingly) on the 3269 fasteners that give his car strength and stamina.

Over 500 screws . . . 331 nuts . . . 400 bolts . . . hundreds of rivets . . . furnish the forces that lock automobile assemblies together.

With this responsibility that fasteners must carry, it is obvious that quality is essential. That's why Russell, Burdsall & Ward makes the huge investment it does—in wire drawing mills of its own, in wire preparation, in laboratory equipment for extensive research, in advanced designs of equipment—all of which contribute to quality control.

Fastener *quality* and production savings go hand in hand. It isn't the initial price but the cost of *using* fasteners that counts. True Fastener *E*conomy lies in *saving* assembly time, *reducing* the need for plant inspection, *getting* maximum holding power per dollar of fastener cost.

True Fastener Economy contributes to the kind of production savings that puts millions of new cars in U. S. driveways every year. It is this type of contribution to major American industries that explains why—for over 104 years—RB&W has been *making strong the things that make America strong.*

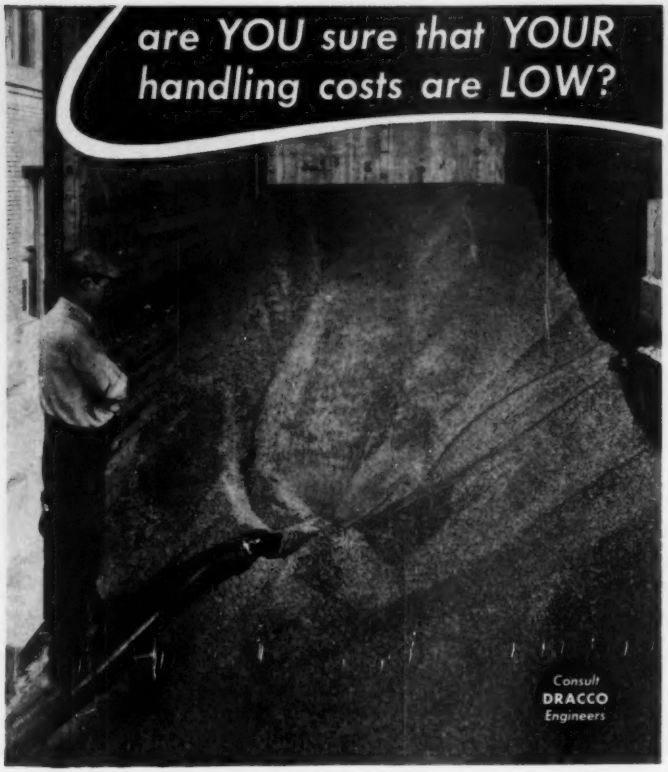
RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

RB&W

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Oakland, Portland, Seattle. Distributors from coast to coast.

3269 Fasteners are used in 1 small American car

104 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG



• Many THINK their cost of handling chemicals, grains and granular material is low only to learn that a considerable saving can be made. DRACCO Pneumatic Conveyors reduce handling costs in so many ways in addition to saving labor, that substantial savings are made in most installations. Handling cost is a vital factor and should be reduced to the minimum. Why not find out how your costs compare with others? DRACCO Engineers have over 30 years experience analyzing handling problems of every description. Why not consult them?

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio New York Office: 130 W. 42nd St.

DUST CONTROL EQUIPMENT

PNEUMATIC CONVEYORS • METAL FABRICATION

Annual Meeting and Industrial Health Conference; in conjunction with American Conference of Governmental Industrial Hygienists, American Industrial Hygiene Association, American Association of Industrial Dentists, and American Association of Industrial Nurses; Book-Cadillac and Statler Hotels, Detroit. Dr. Edward C. Holmblad, Managing Director, 28 East Jackson Blvd., Chicago 4.

11-13, American Society of Lubrication Engineers, Annual Convention and Lubrication Show; Hotel Pennsylvania, New York. W. F. Leonard, Secretary-Treasurer, 343 South Dearborn St., Chicago 4.

11-14, National Association of Corrosion Engineers, Annual Conference and Exhibition; Netherland-Plaza Hotel, Cincinnati. A. B. Campbell, Executive Secretary, 905 Southern Standard Bldg., Houston 2.

11-15, American Society for Metals, 6th Western Metal Congress and Exposition; Shrine Auditorium, Los Angeles. W. H. Eisenman, Managing Director, 7301 Euclid Ave., Cleveland 3.

14-15, American Management Association, Production Conference; Hotel Pennsylvania, New York. James O. Rice, Manager, 330 West 42nd St., New York 18.

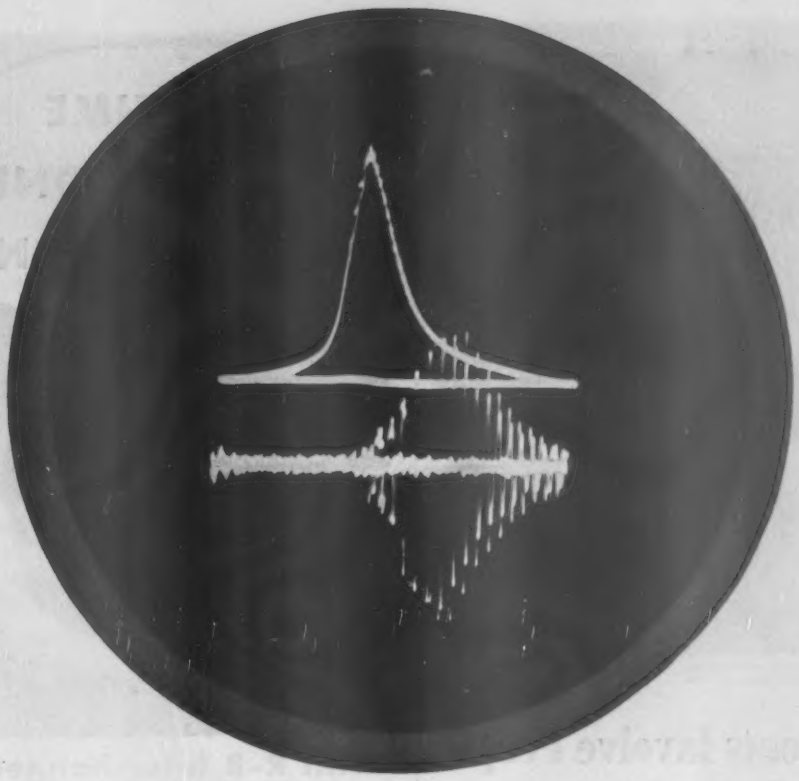
18-20, Midwest Power Conference, Annual Meeting; Sherman Hotel, Chicago. Ronald A. Budenholzer, Director, Technology Center, Chicago 16.

19-20, California Personnel Management Association, 21st Pacific Coast Management Conference; Claremont Hotel, Berkeley, Calif. A. B. Tichenor, President, 442 Flood Bldg., San Francisco 2.

21-22, The Society for the Advancement of Management, Inc., Time Study and Methods Conference; Hotel Pennsylvania, New York. Carl S. Coler, Executive Director, 84 William St., New York 7.

25-27, Triple Mill Supply Convention, American Supply and Machinery Manufacturers' Association, Inc., National Supply and Machinery Distributors' Association, and Southern Supply and Machinery Distributors' Association; Cleveland Auditorium, Cleveland. James J. DeMario, Chairman, Raybestos-Manhattan, Inc., Passaic, N. J.

28-30, National Council of Industrial Management, Annual Meeting; Niagara Hotel, Niagara Falls, N. Y. William F. Meyer, Executive Secretary, 347 Madison Ave., New York.



This is a picture of "PING"

It's a picture that gives automotive engineers clear-cut facts on performance—a picture that suggests how photography with its ability to record, its accuracy and its speed, can play important roles in all modern business and industry.

No, this is not the "doodling" of a man on the telephone. Far from it. It's the photographic record of an oscilloscope trace that shows, and times, detonation in a "knocking" engine. It all happens in a few hundred-thousandths of a second—yet photography gets it clearly and accurately as nothing else can.

Oscillograph recording is but one of countless functional uses of photography in bettering products and improving manufacturing methods. High speed "stills" can freeze fast action at just the crucial moment—and the design or operation of a part can be adjusted to best advantage.

And high speed movies can expand a second of action into several minutes so that fast motion can be slowed down for observation—and products be made more dependable, more durable.

Such uses of photography—and many more—can help you improve your product, your tools, your production methods. For every day, functional photography is proving a valuable and important adjunct in more and more modern enterprises.

Eastman Kodak Company, Rochester 4, N. Y.

Functional Photography

. . . is advancing business and industrial technics

Kodak

Ramps are only a few of the places where Ferrox should be used — *outside* your plant.

Your washroom is only one of the many places which require Ferrox — *within* your plant.

Accidents Involve People

. . . and they can involve you!

Do you know that slips and falls are responsible for about 20% of all compensation claims? And do you know how these can be greatly reduced?

Use non-slip Ferrox.* Wherever there's a slippery condition under foot, Ferrox can be quickly and easily trowelled-on . . . to prevent accidents under wet, dry, or oily conditions.

Ferrox was thoroughly tested and used by the Navy under the most rigorous conditions. In your plant, it may be applied to *any floor surface* — may be used in less than eight hours—and costs surprisingly little.

Why not take a walk through your plant and let your feet tell you exactly where you need Ferrox?

*Reg. U. S. Pat. Off.

Meanwhile, use the coupon below for complete information about low-cost, durable Ferrox.

FERROX

Made by

THE AMERICAN ABRASIVE METALS CO.
IRVINGTON, NEW JERSEY • MAKERS OF FERALUN

PMM 1-49

American Abrasive Metals Co.
460 Coit St., Irvington, N. J.

I'd like to see your illustrated Ferrox Catalog.

Name ..... Title .....

Company .....

Address ..... City ..... State .....

Save TIME and MONEY in DIE BUILDING

with R-B Interchangeable PUNCHES and DIES

R-B punches and dies will cut your die-making costs because they permit use of standardized R-B retainers which can be quickly and accurately mounted. Completely interchangeable, R-B punches, dies and their retainers eliminate large inventories and, unlike most parts used in die construction, have a salvage value. Quickly and easily installed . . . securely locked both vertically and radially . . . they enable operators to make quick changes. Thus press "down time" and press operators' time, as well as die builders' time, are materially reduced.

Punches and dies of standard sizes, shapes and materials are stocked for immediate delivery. Special punches and dies can be made promptly to your specifications.

GET THE WHOLE STORY
In This FREE Catalog

A 48 page book containing full information on Allied's "one stop service." Write for your copy.

ALLIED PRODUCTS CORPORATION

Department 27 • 4632 Lawton Ave. • Detroit 8, Mich

W-964
CONNECTING RODS STEEL FORGINGS — Grind both ends, both sides. 360 pieces per hour.
W-955
TYPE 2 V. O. CRANK, BRASS — Grind 2 sides to .002", 48 pieces per hour.
They were all held on the Blanchard and ground at a profit
PUT IT ON THE BLANCHARD
W-946
CLAM SHELLS ALUMINUM — Grind 1/16" to seal surface. 200 pieces per hour.
W-947
CLAM SHELLS ALUMINUM — Grind off 1/16" approx. 200 pieces per hour.
W-970
TOP MAIN FRAME ALUMINUM — Grind .070" from 2 sides. 14 pieces per hour.

Thousands of similar jobs—requiring grinding of odd-shaped work held in fixtures — are being profitably done on Blanchard Surface Grinders.

If the surface to be ground can be brought to the wheel, a method can be devised to hold almost any piece for Blanchard Grinding. Let us assist you — Blanchard Service is Free.

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Improve Surface Finishes
Increase Tool and Die Life

with PANGBORN HYDRO-FINISH

What is Pangborn Hydro-Finish? It's the new, versatile impact blasting process that uses a fine mesh abrasive suspended in water, yet holds tolerances of the work to .0001 inches.

What Hydro-Finish can do for you Pangborn Hydro-Finish can help you three ways, by improving surface finishes, by removing oxide scale, by lengthening tool and die life through proper maintenance. Here's how . . .

In the Production Line . . . It eliminates many tedious finishing operations. It reduces cost and time involved in buffing. It improves fatigue life of the metal parts it finishes. It cuts many varied manufacturing costs.

In the Tool Room . . . New Hydro-Finish simplifies the manufacture and maintenance of tools, dies and molds. It reduces usual costly handwork and produces a surface virtually free from directional grinding lines.

Write today for details about the new Pangborn Hydro-Finish Cabinet. PANGBORN CORPORATION, 1282 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn For All Latest Developments In Blast Cleaning And Dust Control Equipment.

Pangborn
BLAST CLEANS CHEAPER
with the right equipment for every job

FACTORY'S CATALOG SERVICE

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY

1
AIR CONDITIONING UNITS—AHY and AVY Series. Bulletin C-1100-B33, 8 pages. Features, specifications, construction; photographs and physical data. Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div.

2
AIR TOOLS, PORTABLE—called Stream Power. Horizontal grinders and buffers, vertical grinders, disk sanders, drills, reamers, screwdrivers, nutrunners, wrenches, shears, nibblers. Photographs, descriptions, specifications. Buckeye Tools Corp.

3
ANNUNCIATORS — for signaling purposes. Different models shown, described; dimensional drawings, types, styles, capacities; wiring diagrams. The Autocall Co.

4
BATTERY CELL TESTER — No. 610A, high discharge. Catalog 300, 2 pages, shows model, with specifications, special types of meters. The Sterling Mfg. Co.

5
BELTS—multi-cord and grommet multi-V types. Four-page Catalog Section 2170; cross-section views of construction; charts show sizes, pitch lengths, belt numbers; tables of diameters, ratings, other data. The B. F. Goodrich Co.

6
BOILERS, STEAM—called Alert Automatic. Gas-fired; 2- to 50-hp., for 100-lb. pressure or more. Description, photographs. Tables of sizes, weights, dimensions; list of equipment furnished. 6-page Bulletin 748. Alert Engineering Products Co.

7
BRIDGES, CROSS - OVER — for movement of materials from dock to dock without track bridging equipment. Different types described, illustrated in 4-page Bulletin MS-C-400. Whiting Corp.

8
BUCKET LOADERS—heavy-duty, with integral swivel belt conveyor discharge; 12-page Circular SBC-1048; specifications of different models, photographs of applications. Pettibone Mulliken Corp.

9
BUSWAYS, PLUG-IN—for overhead installation, called Flex-A-Plugs. Circular 151, 4 pages; photographs of typical installations, supporting hangers, plug outlets, mounting clamps, housings; also link feeders, switches, other auxiliary equipment. The Trumbull Electric Mfg. Co.

10
CHAIN VISES—for roller chain, single and double. Photographs of two models; instructions for disassembling chain. Bulletin 48-4. Baldwin-Duckworth Div., Chain Belt Co.

11
CHEMICALS, METAL TREATING —(a) "Deoxidine," 6-page folder; discusses metal cleaning, rust prevention, paint bonding. —(b) Check list of ACP metal-working chemi-

MAILING COUPON—GOOD UNTIL FEBRUARY 28, 1949, ONLY

FACTORY MANAGEMENT & MAINTENANCE (January, 1949)

330 West 42nd Street, New York 18

Please have manufacturers send me, without obligation, literature below:

1	2	3	4	5	6	7	8	9	10	11a	11b	12
13	14	15	16	17	18	19	20	20a	20b	21	22	23
24	25	26	27	28	29	30	31a	31b	32	33	34	35
36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61
62	63	64	65	66	67	68	69	70	71	72	73	74
75	76	77	78	79	80	81	82					

Name.....Title.....

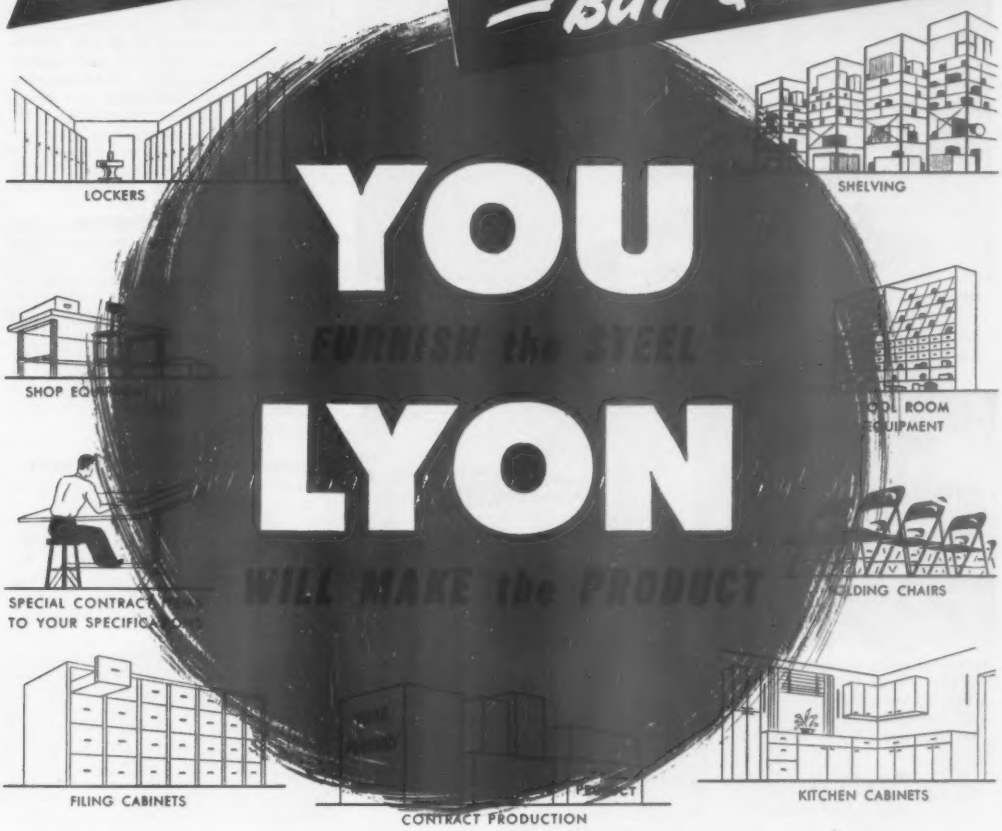
Company.....

Street Address.....

City.....State.....

Please fill out this coupon completely in order to avoid delay in handling. Numbers correspond to description paragraph numbers. Where separate catalogs are described in one announcement, please specify exactly which are desired.

WHAT DO YOU NEED? —BUT QUICK!



YOU FURNISH the STEEL
LYON WILL MAKE the PRODUCT

• We can make prompt delivery on LYON Products if you will furnish us with the sheet steel. We will buy the steel from you and ship the pound-for-pound equivalent in either standard LYON Products at regular published prices (see partial list below) or special items made to your specifications.

Ask your nearest LYON Dealer or LYON District Office for details of the "Customer Steel" plan.

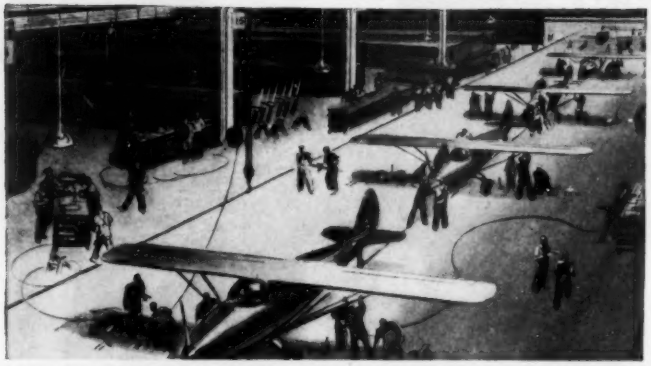
A PARTIAL LIST OF LYON PRODUCTS

LYON METAL PRODUCTS, INCORPORATED

General Offices: 112 Monroe Avenue, Aurora, Illinois
Branches and Dealers in All Principal Cities

- Shelving
- Lockers
- Wood Working Benches
- Economy Locker Racks
- Kitchen Cabinets
- Display Equipment
- Hanging Cabinets
- Welding Benches
- Filing Cabinets
- Cabinet Benches
- Folding Chairs
- Drawing Tables
- Storage Cabinets
- Bench Drawers
- Work Benches
- Drawer Units
- Conveyors
- Shop Boxes
- Bar Racks
- Bin Units
- Tool Stands
- Service Carts
- Hopper Bins
- Parts Cases
- Flat Drawer Files
- Tool Trays
- Desks
- Stools
- Tool Boxes
- Sorting Files
- Ironing Tables

Seven new planes completed ...at a cost of $4.30!



New planes can't fly without control cable, and this manufacturer needed some —fast. He got it the same way he regularly gets many supplies and parts—by Air Express Ordered in A.M., delivered to plant same day 500 miles, 28 lbs., Air Express charge only $4.30. So production continued without a break.

$4.30 included pick-up and delivery at no extra charge—and receipt for shipment. All this, plus the *world's fastest shipping service*. That's Air Express—used with profit by every business.

Shipments go on all flights of Scheduled Airlines. Speeds up to 5 miles a minute—no waiting around. Direct service to over 1,000 airport cities, air-rail for 22,000 off-airline offices.

Facts on low Air Express rates:

22 lbs. of new fashions goes 700 miles for $4.73.
6-lb. carton of new jewelry line goes 1,000 miles for $2.24.
Same day delivery in both cases if you *ship early*.

Only Air Express gives you all these advantages: Special pick-up and delivery *at no extra cost. You get a receipt for every shipment* and delivery is proved by signature of consignee. One-carrier responsibility. Assured protection, too—valuation coverage up to $50 without extra charge. Practically no limitation on size or weight. For fast shipping action, phone Air Express Division, Railway Express Agency. And specify "Air Express delivery" on orders.

SPECIFY AIR EXPRESS
GETS THERE FIRST

Rates include special pick-up and delivery door to door in principal towns and cities

AIR EXPRESS, A SERVICE OF RAILWAY EXPRESS AGENCY AND THE
SCHEDULED AIRLINES OF THE U.S.

cals and inhibitors. American Chemical Paint Co.

12
CLEANER, HAND-TYPE—for light duty. Vacuums, blows, sprays, dries. Photographs of unit in use; suggested applications, specifications. Ideal Industries, Inc.

13
CONDUCTIVITY RECORDERS, CONTROLLERS — 44-page Catalog 15-12. Fundamentals of pH, oxidation-reduction potential and conductivity. ElectroniK potentiometer, Flow Electrode assembly, the Beckman pH amplifier; electrodes, conductivity cells, control valves, motors, pneumatic control accessories. Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.

14
CONVEYORS, ALUMINUM—Characteristics, features. Photographs of typical uses; sketches of construction points. Mercury Conveyor, Inc.

15
CONVEYOR BELT—escalator-type interfloor. 4-page Bulletin FV-48. Photographs, sketches show construction detail, different parts, mountings. Description, specifications, installation diagram. The Rapids-Standard Co., Inc.

16
CONVEYOR, GRAVITY WHEEL—Specifications, capacities, dimensional data. Harry J. Ferguson Co.

17
CONVEYOR, PORTABLE ALUMINUM—weighing 152 pounds. For moving packaged products, or booster connections. Features, construction, capacity, speed. Photograph. Shingle & Gibb Co.

18
CORROSION CONTROL — steam line, 4-page Technical Bulletin describes treatment, how it works, how it is controlled, comparison with other systems. E. F. Drew & Co., Inc.

19
COUPLING SELECTOR—1-page release describes Steelflex coupling selector intended for use in selection and purchase of manufacturer's flexible couplings from sizes 3F to 18F. The Falk Corp.

20
CYLINDERS—**(a)** Air cylinders, 14-page Catalog A-48. Photographs, cross-sectional drawings, construction features. **(b)** Catalog H-48-LP, 14 pages. Same information as above on line of hydraulic cylinders. Hydro-Line Mfg. Co.

21
DEHUMIDIFIER — "The Performance of a Solid Absorption Dehumidifier," Bulletin 124. Reports recent developments, explains method of plotting performance on a psychrometric chart. Illustrated. Pittsburgh Lectrodryer Corp.

22
DIESEL ENGINES—"Diesel Power and Diesel Transportation; Annual

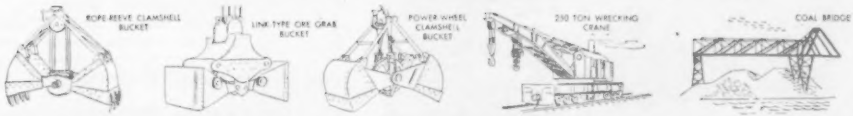
BROWNHOIST DIESEL ELECTRIC LOCOMOTIVE CRANES...30 • 35-40 • 40-50 TON CAPACITIES

PATENT APPLIED FOR

LOOK AT ALL THESE FEATURES!

ROLLER BEARING BOOM-TIP SHEAVES
PATENTED 360° MONITOR TOP CAB
SUMMER AND WINTER FAN GIVES ALL WEATHER COMFORT
HOIST DRUMS ROLLER BEARING MOUNTED
SAFE WORM DRIVEN BOOM HOIST
DIESEL ELECTRIC
DOUBLE DISC SMOOTH OPERATING ROLLER BEARING MOUNTED ROTATING CLUTCHES. ELECTRIC SWING AVAILABLE
14" SAFETY CLEARANCE
CAST STEEL SIDE FRAME TRUCKS
INSIDE HUNG SPRING SUSPENDED ELECTRIC MOTORS ON TRUCKS ELIMINATE TRAVEL CLUTCHES AND GEARING

BROWNHOIST BUILDS BETTER CRANES



INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN

DISTRICT OFFICES NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE, VANCOUVER, B. C., WINNIPEG, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC

At 9 out of 10 of the largest and most important decision points in American industrial purchasing, MacRAE'S BLUE BOOK is used as a reference source "principally" or "exclusively."

Send for your copy of a new survey result booklet, "Where Orders Originate."

18 E. Huron Street, Chicago 11, Illinois

Now...added catcher-capacity on the *New* 8 cu. ft. model 125

Wilshire POWER SWEEPER

New Efficiency, Too!
Riding SULKY
FOR ALL MODELS

- Sturdy steel construction throughout.
- Rubber-tired air wheels with brake.
- Easily detachable.

Presenting a *powerful* new sweeper that covers more area faster...*reduces cleaning time and maintenance costs as much as* 90%. Keeps floors free of welding rod butts, nails, chips, paper, dirt—keeps lawns, drives, parkways, free of paper, sand, debris. For specifications and prices, write today—DEPT. FMM-1

QUICK FACTS

POWER. 2 or 3 h.p. gas motor, air-cooled, 4 cycles.
FRAME. Cast aluminum.
BODY. 20-ga. sheet steel.
SWEEP. 36". Sweeps to within 1" of walls.
FACTORY TESTED. 90-day guarantee.
GUIDE WHEEL. Protects walls and equipment.

DEALERS: Choice Territories Open!

WILSHIRE POWER SWEEPER CO.
4615 Alger St., Los Angeles 26, Calif.

SWEEPING THE COUNTRY SINCE 1940

Diesel Specifications." General information, specifications on commercially manufactured engines, ratings. Benjamin's For Motors.

23

DOORS, ROLLING—Rigid and folding upward-acting doors, rolling and sliding grilles, in wood and metals. 8-page Catalog Y26. Description, operating data, photographs of different kinds. Cornell Iron Works, Inc.

24

ELECTRICAL EQUIPMENT—Line of lamps, starters, contacts, bulbs, plug caps, lampholder adjusters, other products. 24-page 15th Anniversary Catalog 150. Price list, technical data, specifications. Allied Electric Products, Inc., and Sheldon Electric Co., Inc.

25

EQUIPMENT, CHEMICAL AND PROCESS—lead lined; lead products; lead burning; construction. 8-page booklet. Describes use of lead products in chemical process industries. Sketches, construction detail. Knapp Mills, Inc.

26

EXCHANGERS—Designated BCF, for cooling, heating, condensing liquids, vapors, gases. 8-page Bulletin 1.1K1. Photographs, cut-away drawings, diagrams show operating principles, characteristics, parts of different models. Table of sizes, dimensions, weights. Ross Heater & Mfg. Co., Inc.

27

EXHAUSTERS, COMPRESSORS—steam jet, for use in connection with pump priming, exhausting, evacuating, cleaning, transporting, agitating liquids and gases. Bulletin 4-E; tables, charts, drawings; construction, operation. Schutte & Koerting Co.

28

FIRE EXTINGUISHER, DRY CHEMICAL—emergency hand model. 6-page folder. Photographs, how to use, how to recharge. Ansul Chemical Co., Fire Extinguisher Div.

29

FLOORING—factory waxed asphalt tile, strips, plastic cove base; 4-page Bulletin A&101 shows colors, styles, suggested patterns and combinations. Hachmeister, Inc.

30

FLOORING, EMERY-AGGREGATE—4-page Bulletin 802. Story of test installation in a railroad system; weight and type of traffic, use of ice-removing chemicals, other tests. Walter Maguire Co., Inc.

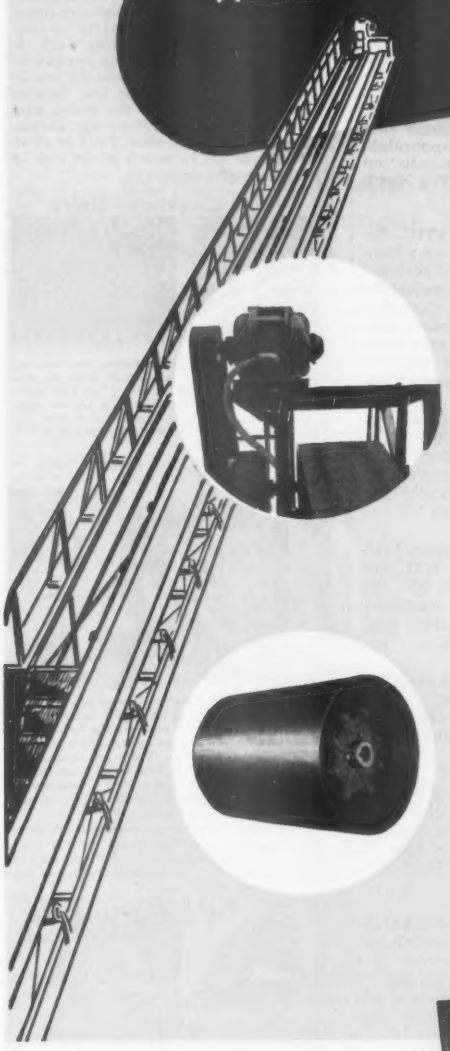
31

FLOOR MACHINES—(a) Model D, with reversible brush; (b) Model E, with twin brushes. Photograph, features, construction data and specifications. Corbin Screw Div., The American Hardware Corp.

32

FLOORS, CONCRETE—called Lumnite. Description, characteristics. Method of placing, finishing; materials used; curing process. Also mortar for tile floors. Typical uses;

HOW YOU CAN MODERNIZE AND SIMPLIFY CONVEYOR DESIGN



By combining *American* Reduction Drives and *American* Conveyor Pulleys you get many unique advantages that help you modernize appearance, improve performance, and reduce installation and operating costs of the conveyors you design.

American Reduction Drives save space—the Unit mounts directly on the shaft of the driven machine. These Drives are compact, weigh less than ordinary drives, are neater in appearance. No "old-fashioned" supports or foundations are needed . . . installation is usually made in a matter of minutes. Any driven speed below 154 rpm is quickly obtainable; and once on the job, *American* Reduction Drives reduce maintenance costs because the primary belt drive absorbs damaging shock loads.

Rugged *American* Welded Steel Conveyor Pulleys combine light weight with high strength for long service life. Their true-running qualities result in efficient performance, less belt wear. They are easily, quickly installed because of their interchangeable hubs—and when combined with *American* Reduction Drives, installation of the complete Unit can be made with assembly line speed. Best of all, *American* Reduction Drives and *American* Conveyor Pulleys are standard, stock items!

Decide now to add all these design and production benefits to the conveyors you design. It's easy to get complete selection and installation data—just drop us a line for descriptive literature.

The American Pulley Company

4210 WISSAHICKON AVE., PHILADELPHIA 29, PA.

AN AMAZING LUBRICANT!

LUBRIPLATE 130-AA

Protects against
RUST AND CORROSION

A super grease-type lubricant! — A marvelous anti-seize compound and a real protector against rust and corrosion. From the standpoint of general utility and diversity of important uses LUBRIPLATE 130-AA is unequaled. While it is ideal for the heaviest loads, this remarkable lubricant does not cause drag and actually conserves power. Write for a free copy of the LUBRIPLATE Service Hand Book.

Rx FOR YOUR MACHINERY

No. 2 — Ideal for general oil type lubrication, ring oiled bearings, wick feeds, sight feeds and bottle oilers.

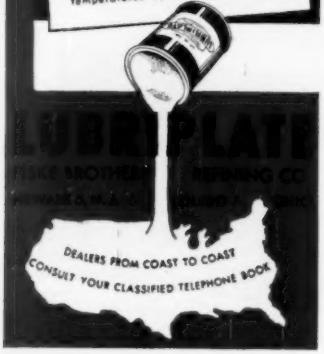
No. 8 — Because of high film strength and long life it reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107 — One of the most popular grease type products for general application by pressure gun or cups.

No. 70 — For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA — Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING — This is the LUBRIPLATE Lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.



questions and answers. Lumnite Div., Universal Atlas Cement Co.

33

GAGES, PRESSURE AND VACUUM—indicating and recording, recording flow meter and pressure, air-operated controller, non-indicating pressure controllers, indicating furnace pressure controllers, pressure regulator, and others. Catalog 7000, 32 pages, photographs. Brown Instrument Co., Div. of Minneapolis-Honeywell Regulator Co.

34

GAS-BURNER CONVERTER—called Oiltogas, for use with gas-fired ovens, furnaces, boilers, to convert them to use of Nos. 1, 2, or 3 fuel oil. Photographs show apparatus; operating principle and installation described. Bulletin 2605. The North American Mfg. Co.

35

GENERATORS, AUTOMATIC—for both steam and hot water, sizes from 10- to 300-hp. Diagrammatic sketches of combustion operating principle, automatic firing sequence, electronic controls, flame characteristics, construction details, performance data, standard ratings. 6-page Bulletin P-1. Cyclotherm Corp., Dept., 121R.

36

HEATING PANELS—using electrical filaments woven in fiber glass, called Super-Heaters, for high-temperature industrial processing. Used horizontally or vertically. Industrial Radiant Heat Corp.

37

HEATING UNITS—immersion heaters, Types IC, IS, ISL, ICU, and straight rod heaters, Types RC, RS, and RI. Photographs, diagrams; charts, dimensions, installation data. The Yale & Towne Mfg. Co.

38

HOIST, AIR—for materials handling. Photographs, diagram of models; performance data, characteristics; chart of capacities, dimensions, prices. Miller Motor Co.

39

IRON CEMENT—for bell-and-spigot joints. Called Smooth-On No. 5. Description, characteristics; photographs of three methods of application. Quantities needed. Dept. FM, Smooth-On Mfg. Co.

40

INSTRUMENTS, SPEED-MEASURING — chronometric, centrifugal, resonant reed tachometers; the Tachonorm, Tachoscope, Tachograph. Description, operation, selection. 28-page bulletin. James G. Biddle Co.

41

INSULATION, THERMAL — 32-page booklet, "Simplified Physics of Thermal Insulation," discusses heat transfer, condensation, radiant heating, fire, vermin, mold. Sketches show characteristics of different kinds of insulation, installation procedures. Infra Insulation, Inc.

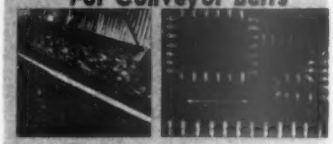
42

KEYWAY BROACHES—and broach

Present Day Practice in Belt Fastening

Every man who has anything to do with the purchase, application or maintenance of conveyor, transmission or V-belts will find the bulletins listed below of considerable value in connection with belt fastening work. A knowledge of present day practice in belt fastening helps reduce the loss in machine hours due to belt failures caused by the use of the wrong type of fastener or improper application. We shall be glad to send any or all of them to you or to any of the men in your organization.

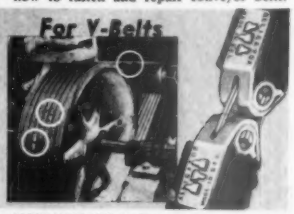
For Conveyor Belts



FLEXCO HD Belt Fasteners are used to make a "water-tight" butt joint in conveyor belts ranging from ¼" to 1½" thick and of any width. The view on the right shows the various types of rips that can be repaired with these fasteners and Flexco HD Rip Plates.

Bulletin F-100 gives complete details on how to fasten and repair conveyor belts.

For V-Belts



ALLIGATOR V-Belt Fasteners are now being widely used to fasten B, C and D, open-end V-belting of cross woven fabric core construction now being made by most belting manufacturers. The view at the left shows a typical application of these fasteners to a drive where endless V-belts would require dismantling the machinery to put the belts on the sheaves.

Bulletin V-205 gives complete instructions on how to use V-belt fasteners.

FLEX V Fasteners for A and B belts are also available for lighter duty V-belt drives. Ask for **Bulletin V-14.**

For Transmission Belts

ALLIGATOR Steel Belt Lacing is in world-wide use to make smooth, flexible joints in leather, rubber, balata, stitched canvas or solid woven belts up to ⅜" thick and as wide as they come.

Bulletin A-60 tells how to fasten and repair transmission belts.

Sold by Supply Houses Everywhere

FLEXIBLE STEEL LACING COMPANY
4678 Lexington St., Chicago 44, Ill.

8 A.M. EFFICIENCY

maintained **ALL DAY** with **ORTON**

ONE-MAN

AERO-CRANE

POWERMATIC AIR-CONTROL

No Afternoon Fatigue Let-Down

One Man, with the Powermatic Air-Control Orton Aero-Crane loads and unloads cars, trucks, gets material onto the stockpile and off with *early-morning* efficiency *all day.*

Effortless Orton air-control enables one man with the Aero-Crane to handle 200 to 1000 lb. loads that eat up the time of a yard crew. Aero-Crane pays for itself in saved man hours.

Designed to SPEED Yard Work

Orton one-man Aero-Crane travels rapidly job to job with boom in any position.

Insures SAFE lowering of heavy loads against *compression of the engine.*

Full-view cab. Full circle turntable. Anti-friction bearings. Non-burn Orcoin V-type clutches. SAFETY spring-applied, air-released hoist brakes. Electro-welded construction.

Eight models, 3,500 to 60,000 lbs. capacity. Diesel or gasoline powered.

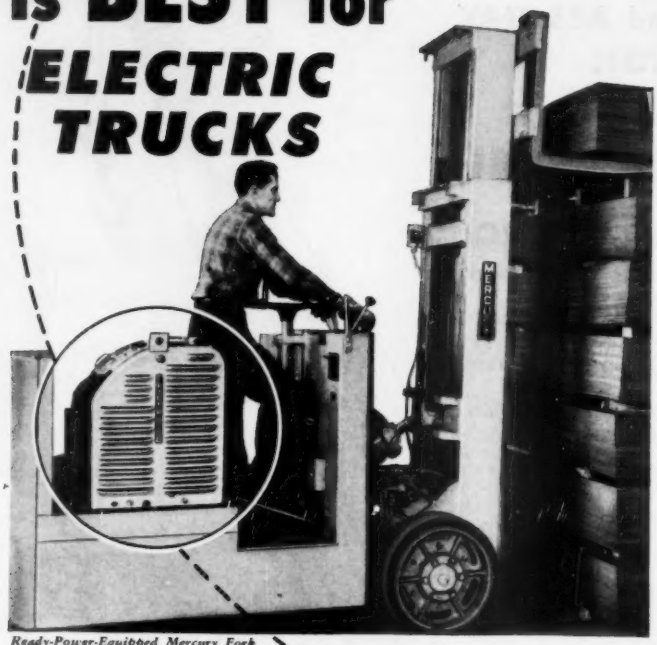
Send for Catalog 73-B for full details and roster of Orton world-wide users

◄ Long-life Orton Aero-Crane has most rigid car body of any crane built. Goes anywhere a truck will go. Operated, traveled and steered from craneman's seat.

ORTON CRANE & SHOVEL COMPANY

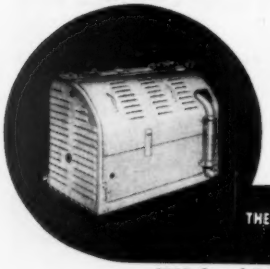
608 South Dearborn Street, Chicago 5, Illinois

READY-POWER is BEST for ELECTRIC TRUCKS



Ready-Power-Equipped Mercury Fork Truck

Ready-Power-Equipped Clark "Utilitruc"



BEST because Ready-Power delivers "constant-peak" electric power generated right on the chassis by the Ready-Power gas-electric Unit.

BEST because Ready-Power Units are available to fit the specifications of any electric truck manufacturer and can be installed at your request.

BEST because *only* Ready-Power can give you the constant availability of gasoline PLUS the flexibility and low maintenance of electric drive.

Visit the Ready-Power Display at Booth 435, 3rd National Materials Handling Exposition, January 10 to 14, Convention Hall, Philadelphia, Pa.

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

kits for hand-cutting of keyways in gears, cutters, couplings, collars, propellers. Four-page folder. Photographs of different sets, equipment, bushings. Charts of widths. The duMont Corp.

43

LAMPHOLDERS—single or multiple units, for floodlighting. Footcandle tables, construction features, table of specifications of basic units, accessories. Sketches, photographs, 4-page Form 1005. Steber Mfg. Co.

44

LIGHT, AUTOMATIC EMERGENCY—called Big Beam Model 2-AD Special. List of uses; descriptions. Photograph. U-C Lite Mfg. Co.

45

LIGHTING EQUIPMENT, FLUORESCENT—Bulletin AD 5428, 6 pages. Shield-Flo 40 units described, applications for general and localized installations discussed. Specifications, separable construction, porcelain enamel reflectors, longitudinal shield, ballast and starters, power consumption, flicker, wiring, grounding, chain and conduit mounting. Benjamin Electric Mfg. Co.

46

LIGHTING FIXTURE—called Cell-Ceil, of louvered, baked-enamel, all-metal construction. Information and installation data sheet, description. Federal Enterprise, Inc.

47

MAGNETIC STARTER — Size 1, Type RA; local, remote, contactor. Photographs, descriptions. Sketches show interchangeability of auxiliary switches. Wiring diagrams; catalog data. 8-page booklet. The Arrow-Hart & Hegeman Electric Co.

48

MATERIALS HANDLING EQUIPMENT—96-page Junior Catalog 487; hand, hydraulic, electric lift trucks; pallet trucks; "Nifty" lifting system; skids, stacking frames; hoists, elevators; cranes; work benches. Barrett-Cravens Co.

49

MOTORS—called Streamway Vertii closed. Color photographs, cut-away drawings show construction, operating principles, downdraft ventilation, lubrication. 12-page Form F1454 U. S. Electrical Motors Inc.

50

MOTORS, INDUCTION—called Tri-Clad, in open, drip-proof models. Photographs, diagrams, show construction details, wiring; features. 12-page booklet GEA-3580-D.1. General Electric Supply Corp.

51

PLANT SERVICE EQUIPMENT—materials handling, storage, fire protection; war surplus equipment. Photographs, features, capacities, specifications, of different types. Acme Equipment Co., Inc.

52

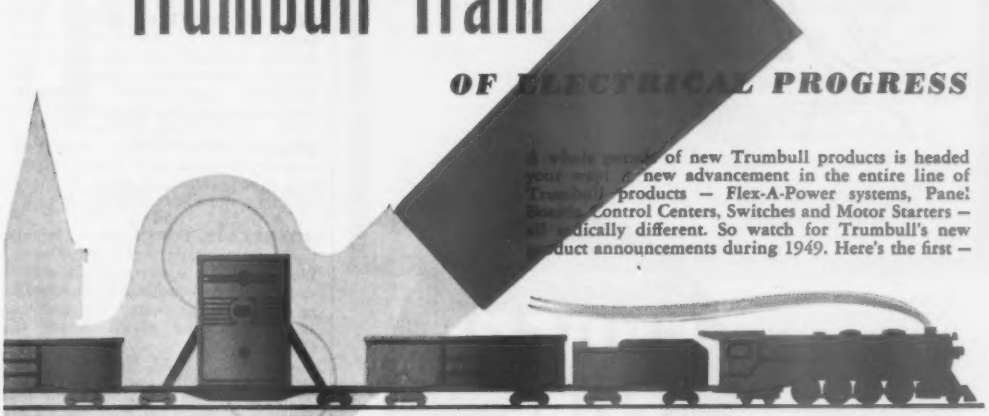
PLASTICS, LAMINATED — "This Formica World," houseorgan, Vol. 1, No. 1, on developments and applications of Formica products. This issue contains 4-page section on use

HERE COMES THE

Trumbull Train

OF ELECTRICAL PROGRESS

A whole parade of new Trumbull products is headed your way! Each a new advancement in the entire line of Trumbull products — Flex-A-Power systems, Panel Boards, Control Centers, Switches and Motor Starters — all radically different. So watch for Trumbull's new product announcements during 1949. Here's the first —



A NEW

Magnetic Motor Starter and Magnetic Contactor

New, from top to bottom, Trumbull Starters and Contactors in sizes 0, 1, 2, 3 give maximum protection to motors up to 50 hp, 440 v. Look at all their important new advantages:

LONGER CONTACT LIFE —
Actual factory tests show the silver contacts on the Trumbull starter "make and break" for millions of operations — many times more than any starter on the market.

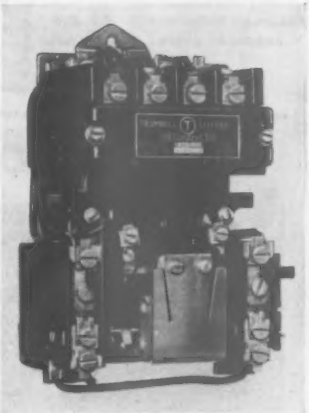
EASY TO MAINTAIN —
Silver contacts have permanently attached springs that are easy to remove. Terminals are located on the front and are easy to wire — a screw driver is all you need to disassemble starter — can be accomplished in less than a minute.

EASY TO INSTALL AND SERVICE —
Note convenient knockouts, large terminals, front connections, and ample wiring space.

GREATER PROTECTION —
Bi-metallic relay heaters follow motor's heating curve. Easily adjusted for automatic or manual reset.

BUILT TO LAST —
All parts resist corrosion and moisture. Examine plastic coil enclosure to see how the tough varnish impregnation protects windings. Contact points and cold-molded asbestos arc hood eliminate arcing . . . give clean "make and break" contact.

QUIET OPERATION —
Permanent lubricant impregnated in the plastic coil enclosure keeps magnet guides sliding smoothly . . . eliminates low voltage "chatter."



FOR MORE INFORMATION about this latest Trumbull development, write for Circular TEC 11. THE TRUMBULL ELECTRIC MANUFACTURING CO., Plainville, Conn. Other factories and offices throughout the United States. Foreign representation.

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

He read it somewhere . . . "All up-to-date cranes are rigged with Crosby Clips!"

Industry buys more

CROSBY CLIPS

than all other drop-forged fasteners!

9901

Fasten wire rope with CROSBY CLIPS. Safe, simple, speedy . . . applied anywhere by one man with one wrench. *Drop-forged*, not cast. Hot dip galvanized. All sizes . . . for ⅛" to 3" wire rope. Distributors everywhere; made only by AMERICAN HOIST AND DERRICK CO., St. Paul 1, Minnesota.

ALSO MAKERS OF THE AMERICAN HANDIWINCH AND AMERICAN BLOCKS AND SHEAVES

This is how STROM BALLS are born

A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape.

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

of Formica products in new Terrace Plaza Hotel in Cincinnati, and other stories. The Formica Co.

53

PROTECTIVE COATINGS—for corrosion control. Three groups, features of each. Photographs, instructions. United Chromium Inc.

54

RELAYS, CONTROL—Bulletin 2100 describes line of relays, with exact contact arrangement, mounting details, construction required for different applications. Features, characteristics. Struthers-Dunn, Inc.

55

RELAYS, MAGNETIC — miniature models. Bulletin 102; features, general description, coil data, voltages. Ward Leonard Electric Co.

56

RHEOSTATS, TUBULAR — Various styles of standard, screw-drive, double, graded, switchboard, metal caged, and non-inductive. Diagrams, selection suggestions; dimensions. 12-page Bulletin 41-17. James G. Biddle Co.

57

ROLLER BEARINGS, TAPERED—12-page booklet, "The Story of the Better Tapered Roller Bearing." Types of bearings, capacities, lubrication. Tyson Bearing Corp.

58

RUST PREVENTIVE PAPER—chemically treated, gives off vapor which protects surfaces of iron and steel products from moisture, air. Product specifications, photographs. Nox-Rust Chemical Corp.

59

SAFETY HELMETS—caps, winter linings. Called Turtle-Back. Photographs, descriptions, characteristics. Industrial Products Co.

60

SCAFFOLD — tubular-steel knockdown. Standard panels, braces, fixtures. Sketches of construction details; photographs of applications. 4-page Folder A-2. Advance Scaffold Div., Beaver Art Metal Corp.

61

SHIPPING CONTAINER, STEEL—275 cu.-ft., weathertight. Designed to protect cargo against pilferage, breakage, spoilage. 16-page booklet, "Millions for Tribute." Dravo Corp.

62

SPRAYER, PRESSURE—for insecticides, rodenticides, weed killers, paint, other liquids. Refillable CO_2 cylinder mounted separately. Carrying strap on 3-gal. Model 120-6; 4-gal. Model 120-8 mounted on two-wheel cart. R. E. Chapin Mfg. Works, Inc.

63

STAINLESS STEEL, LIQUID—Technical Bulletin A-21 describes compound of flaked stainless steel in vinylic copolymer resin base, for brushing, spraying. Corrosion-, chemical-resistance explained; room-temperature quick-dry or baking processes, transparent dyes for coloring; other characteristics dis-

Turning a bakery's paper losses into **REAL PROFITS**

INVESTIGATE HOW THERMOTECHNICS CAN MAKE *YOUR* TEMPERATURE VARIABLES CONSTANT

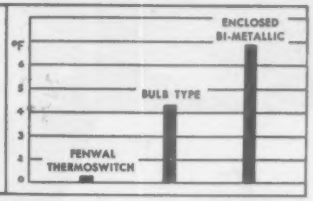
When uncontrolled electric heat on a bread-wrapping machine repeatedly set fire to the wax paper, this bakery called on Fenwal for automatic heat control. Thermotechnics solved the problem with a properly applied cartridge THERMOSWITCH* Control. This result of Thermotechnics suggests that you, too, can benefit from Fenwal's broad experience in temperature control and detection.

ELEVEN THERMOSWITCH* TYPES COVER MANY APPLICATIONS

Wherever you require a sensitive thermostat with low thermal lag, complete enclosure against dust, gases and vapors, and high resistance to vibration, the chances are there's a standard THERMOSWITCH* Control to do the job. Capable of holding temperatures from —100° to 600° F. under close control, THERMOSWITCH* Controls come in types that are easily inserted into closed gas or liquid systems; applied to incubators, ovens, ducts, warming and cooling cabinets, etc.; submerged in liquids or vapors; and in all-purpose types for many laboratory and industrial applications.

BUILT TO STAND ABUSE

Showing the change in the set point of a THERMOSWITCH* Control in comparison to two other types of thermostat when subjected to a mechanical shock of 100 G.



WRITE FOR LITERATURE

A comprehensive bulletin gives detailed specifications, test results and application data about Fenwal THERMOSWITCH* Controls. Write for your copy today. Fenwal, Incorporated, 23 Pleasant Street, Ashland, Mass.

Fenwal

THERMOSWITCH*

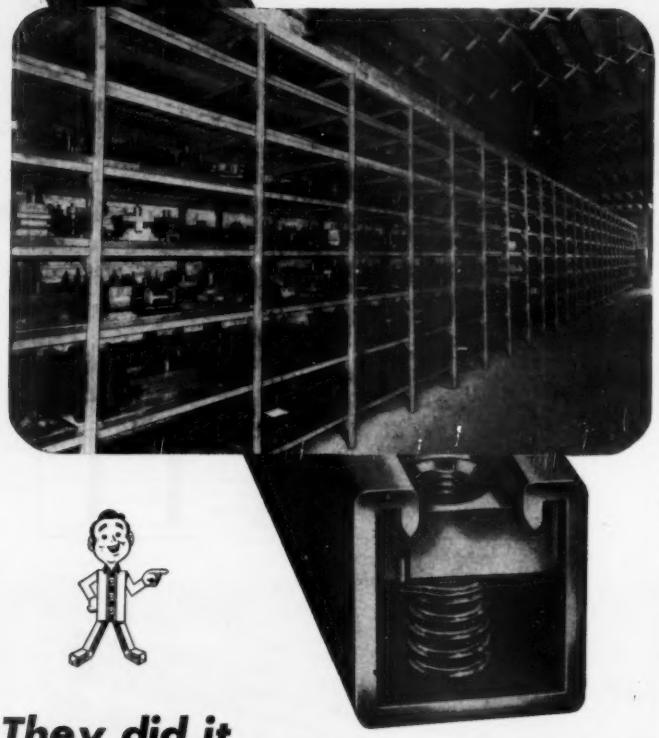
Temperature Controls . . . Over-Heat and Fire Detectors

SENSITIVE . . . *but only to heat*

*Reg. U. S. Pat. Off.

SPEAKING OF STRENGTH WITHOUT BULK

Adjustable Unistrut Die Racks are simple to assemble and capable of supporting tremendous weights. Here tons of metal dies, over 10,000 of them, are stored on this 110 ft. Die Rack.



They did it with "UNISTRUT" ALL-PURPOSE METAL FRAMING

You also can quickly, easily and economically build all types of shelving, framing, supports, mounts, racks, tables and benches—pipe and cable hangers, fluorescent fixture supports — and many other structures with only a hacksaw and wrench.

Here's real "strength without bulk." Completely adjustable and reusable Unistrut is steel channel with a continuous slot. You simply insert the Unistrut spring nut at approximate point where you wish to attach another framing member, slide to exact position, bolt and tighten. No drilling or welding required.

ALL PURPOSE UNISTRUT METAL FRAMING

Unistrut gives flexibility and installation advantages that can't be attained by old-fashioned methods of frame construction.

Write for Bulletin No. 15.

PRODUCTS COMPANY
1013 W. Washington Boulevard
Chicago 7, Illinois • Phone MO 6-2665
REPRESENTATIVES IN PRINCIPAL CITIES

cussed. Plastics Div., The Lockrey Co.

64

STATIC ELIMINATOR—"Industrial Applications of the Ionotron Static Eliminator," 8 pages. Description, photographs of device; applications, operating principles, construction. U. S. Radium Corp.

65

STEEL ALLOY—free machining, called Rycut. Round, square, flat bar stock. Data on hardenability, mechanical properties, analysis. Joseph T. Ryerson & Son, Inc.

66

STEEL BANDING—equipment and accessories, including tensioners, sealers, different kinds of tools. Six-page folder; photographs, dimensions, tensile strengths. Allegheny Steel Band Co.

67

STEEL SHELVING, UNIT BINS—prefabricated, adjustable. Descriptions, characteristics, dimensions of different types, models. Catalog 1A. Fort Steuben Metal Products Co.

68

SUBSTATIONS, LOAD CENTER—standardized units; 16-page Bulletin 11B6285A. Selector monogram for determining correct air circuit breaker for different applications; sizes, dimensions of transformers; different types of switchgear, space requirement. Photographs, diagrams. Allis Chalmers Mfg. Co.

69

TAPE, SELF-ADHESIVE—Vol. 1, No. 1, houseorgan, for general dissemination of information on new developments in printed pressure-sensitive cellophane or acetate fiber tape. Topflight Tape Co., Div. of Topflight Tool Co., Inc.

70

THERMOCOUPLES — wire, heads, connectors, plug and socket assemblies, insulators, protecting tubes, radiation heads. Selection tables, methods of checking thermocouples and pyrometers, installation data. Temperature-millivolt curves, resistance tables, pipe and wire sizes. 40-page Bulletin T/C 7. Wheelco Instruments Co.

71

THREADING MACHINES — pipe and bolt; stocks, dies; turret, semi-automatic lathes. 32-page booklet, "The Muscle Misers: Adventures in Pipe Threading." Cartoons illustrate short sketches, "Case of the Distributor's Salesman," "Case of the Factory Maintenance Man," etc. Also photographs, descriptions of apparatus. The Oster Mfg. Co.

72

TIRES, RUBBER—"The Story of the Tire," 64-page Golden Jubilee Commemorative booklet. Outlines history of the company, development of the tire, from the first bicycle to today's huge airplane wheels. Photographs show step-by-step proce-

You may have *plenty* of extinguishers . . . BUT are you *sure* they're ready for action?

Periodic inspection and maintenance, recharging when necessary . . . these steps are essential to keep your fire extinguishers ready for *immediate* action.

Perhaps this involves a serious drain on the time of your personnel—who may be urgently needed for productive tasks. If so, here's a suggestion.

Why not let your Kidde representative take on the job?

He is prepared to offer you, on an annual contract basis, a comprehensive service covering all phases of fire-extinguisher service. He will call at regular intervals, to check the condition of your equipment, and will let you know immediately when recharging and repairs are needed. He has full facilities for the actual handling of the recharging or repairs.

Such an arrangement can help you, in other ways, to make most effective use of your fire extinguishers. As a specialist in fire-fighting, your Kidde representative may be able to *locate* your extinguishers to better advantage. Perhaps one extinguisher is hard to reach. Perhaps two types of extinguishers would give better protection if their positions were interchanged. You'll find such a service well worthwhile—why not look into it?

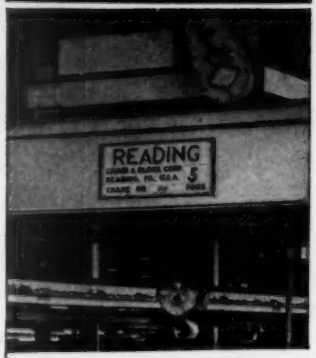
K Kidde

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

Walter Kidde & Company, Inc. • **132 Main St., Belleville 9, N. J.**

FAST MATERIALS HANDLING
For YOUR New Building!



• New buildings, like new machines, are *designed* to increase output and reduce unit costs. That's why it pays to consult a Reading Engineer *before* you install handling equipment in a new shop or plant. For example, in this new annex, crates of sheet steel moved too leisurely from flat cars, to stock pile, to motor truck . . . until a Reading Engineer was consulted. After careful analysis, 2 *specially-designed* 5-ton Reading Cranes, equipped with electric push buttons were recommended and installed. Now crates "step lively", handling time is reduced. *and fewer men move more materials, more easily!* Start your new building "off on the right foot", now. For faster, more economical materials handling, call in a Reading Engineer. His experienced recommendations are yours—at no obligation.

READING CHAIN & BLOCK CORPORATION
2103 ADAMS ST., READING, PA.
Chain Hoists • Electric Hoists
Overhead Traveling Cranes

READING HOISTS

dure in making both rubber and synthetics. The Goodyear Tire & Rubber Co.

73

TOTE BOXES—of chemically hardened corrugated board. Eight-page folder shows different kinds, for different applications. Convoy, Inc.

74

TRUCKS, LIFT—Line, called Hydroelectric, 12-page Bulletin K-48, includes models K, pallet and platform; EHW, with rear-wheel drive; the Tow Tractor; and others. Skid loading, width-clearance, underclearance, overhang discussed. Photographs, sketches, diagrams. Lift Trucks, Inc.

75

TRUCK, SHOVEL AND BUCKET—called Transport RockerShovel; 4-page booklet. Features, photographs of three different models, typical uses of each. The Eimco Corp.

76

VALVE — pressure reducing and regulating, Type B; 8-page Bulletin 265. Cutaway view, diagram. Dimensions; specifications; capacity charts for water, steam, air. A. W. Cash Valve Mfg. Corp.

77

VALVES, LUBRICATED PLUG—Cross-section views; dimension, price tables; lubricants; wrenches and locking arms; hydraulic actuator. H. K. Porter Co., Inc.

78

VALVES; SAFETY, RELIEF—72-page Catalog 48; specifications, capacity tables, uses. Safety, general relief, safety relief, nozzle type, and chemical corrosion resistant valves. Flange standards, sizing methods. Farris Engineering Corp.

79

WASTE RECEPTACLES — with stainless steel feet. Standard line, six sizes; also special models. Features, liners; photographs. Table of specifications. Catalog 548, 8 pages. The Bennett Mfg. Co.

80

WATER TREATMENT—liquid conditioning. Equipment, engineering services, analytical and research facilities described. List of different fields in which apparatus is being used. Photographs of installations. Liquid Conditioning Corp.

81

WELDING, CUTTING APPARATUS—38-page Apparatus Catalog, Form 20B, describes, illustrates welding and cutting units, accessories, auxiliary equipment. Features, specifications, of different types. Victor Equipment Co.

82

WIRE ROPE—50th anniversary wire rope catalog, 188 pages. Cross-sections, diagrams, pressure and capacity tables, typical applications. Photographs, sketches, tables, characteristics, specifications. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

SAVE

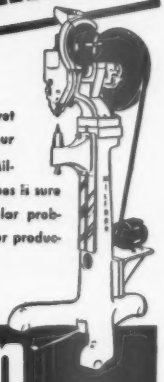
• MATERIALS
• MAN-HOURS
• MONEY

with the . . .

RIGHT RIVETS

Select exactly the right semi-tubular, split rivet, or cold-headed fastener from Milford's complete line. You'll find it pays in every way!

RIGHT MACHINE



Then use the right rivet setting machine for your application. One of Milford's 15 basic machines is sure to solve your particular problem . . . and slash your production costs!

Write to Dept. A.

PENN RIVET & MACHINE COMPANY
254 Huntingdon Street
PHILADELPHIA 33, PENN.

MICROTRIP... the power press safety device that increases production 3 ways...

MICROTRIP control box and switches. A special bridge circuit is so arranged that accidental or deliberate operation of only one switch will immediately open the control circuit and make it inoperative.

MICROTRIP is a new safety device which provides increased production and added safety. It is an electrical control for actuating tripping mechanisms on punch presses, spot welding and riveting machines, and air presses.

Finger-tip actuation . . . as little as 10 ounces . . . permits steady, fast press work with a minimum fatigue factor. Realization that both hands must be out of the hazard area before a press can operate also increases the speed of operation.

Unless both switches are touched at the same time the control circuit automatically becomes inoperative. It remains so until a button on the side of the control box is manually reset. It cannot be "cheated".

MICROTRIP is quickly and easily installed on present equipment. It is a product of MICRO SWITCH, whose precision switches are well known throughout industry.

Write MICRO SWITCH today.

© 1949 First Industrial Corp.

MICRO SWITCH
A DIVISION OF FIRST INDUSTRIAL CORPORATION
FREEPORT ILLINOIS U.S.A.

Branch Offices: Chicago • New York • Boston • Cleveland • Los Angeles **Sales Representatives:** Portland • St. Louis • Dallas • Toronto

IF YOU——
had a chance

to step into a better job

WOULD YOU
BE PREPARED?

These are times of change in the business world. New jobs are opening up, and they must be filled, and filled quickly—with men who are able. Here are books giving quick access to fundamentals and practices that promote executive efficiency. They help you prepare yourself so that when *your* opportunity comes, you will be ready.

The McGraw-Hill Library of
BUSINESS MANAGEMENT
6 vols., 1973 pages

1. BUSINESS ORGANIZATION
2. BUSINESS FINANCE
3. CREDITS and COLLECTIONS
4. EFFECTIVE MARKETING
5. BUSINESS CORRESPONDENCE
6. MANAGING YOURSELF

THE books in this library cover the elements and methods of management most needed in executive approach to business. Use it for immediate help in specific problems—to get the knowledge of *all* business you need right now.

The need for this sort of help, and the most practical means of meeting it, have been the standards by which Milton Wright has sifted, chosen and organized the material in this Library. From it you can get the guide posts you need in tackling new duties, in assuming executive responsibilities, in knowing the job and getting it done.

- How to organize a single department or a whole business . . . plan and control its workings
- Where and how to get money . . . how to utilize it
- How to reduce credit losses . . . modernize your collection system
- How to write better letters . . . put your correspondence on a more effective basis
- How to improve your sales organization . . . develop promotion ideas
- How to do more work . . . conserve and direct your energies

Free Trial—Low Price—Easy Terms

Under our offer get all six books on approval. Read them, make comparisons, look up specific problems. If this 10-day test shows value, pay in small installments, while you use the books. Send the coupon today.

McGraw-Hill Book Co., Inc., 330 W. 42d St., N.Y. 18

Send me the McGraw-Hill LIBRARY OF BUSINESS MANAGEMENT, 6 volumes, for 10 days' examination on approval. In 10 days I will send $2.50 and $3.00 monthly until $17.50 is paid, or return the books postpaid.

Name .....

Address .....

City and State .....

Position .....

Company Fac-1-49

F.O.S. Industrial Tape is pressure-sensitive. Sticks to the touch. No special preparation needed. Stays put!
F.O.S.
INDUSTRIAL TAPE
(FRICTION ONE SIDE)

REDUCE PRODUCTION COSTS—F.O.S. Tape is handy, versatile, inexpensive. Simplifies production in *many* ways . . . Stays put—but can be removed quickly without requiring "cleanup." Let SEAMLESS analysts show you how to save time and money with F.O.S. No obligation! . . . *Write today for samples and prices.*

FINEST QUALITY SINCE 1877

REG. U. S. PAT. OFF.

INDUSTRIAL TAPE DIVISION
THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN., U. S. A.

Fifteen years of successful application to many types of stockroom service has demonstrated that it is possible through the use of INVENTROLERS* to

INCREASE STOCKROOM SERVICE 70%

with no change in present inventories

or

REDUCE INVENTORIES 1/3

with no change in stockroom service

For full particulars of this Modern Plan write to:

WILSON INVENTORY MANAGEMENT ACTIVITIES, Inc.

540 RIDGEWOOD ROAD, MAPLEWOOD, N. J.

*Copyrighted and trade-marked devices for scientific control of inventories.

For Your
REFERENCE FILE

FACTORY offers the following reprints. They treat, concisely and authoritatively, subjects of vital importance under today's conditions of production and employee relations.

PRICE 35 CENTS EACH

(Postpaid)

3. Standard Costs and Flexible Budgets
7. Quality Control
9. Motion Economy
15. Plant Layout
38. How to Rate Jobs and Men
43. A Point Plan for Rating Jobs
45. Foremanship Fundamentals
47. The Foreman On His Job
64. Organization and Control of Mass Production
70. Set Up a Manpower Control Program
78. Provide Adequate Electrical and Mechanical Services
82. Standard Times for Maintenance
86. Motion-Time Standards
87. Low-Cost Power for Low-Cost Products
90. Standardized Factory Facilities
91. Dramatizing Personnel Policies
93. Planning the Pallet System
96. Air Conditioning
97. P-Charts For Quality Control
98. Multiple Management
99. Lubrication
100. Production Planning
101. Your Electric Motor
102. When Foreman Deals With Worker
103. Fire-Fighting Equipment
104. Plant Lighting
105. Variable-Speed Drives
106. Better Vision for Greater Efficiency
107. Revamping Electrical Distribution Systems
108. Trolley Conveyors
109. Methods-Time Measurement
110. Antifriction Bearings
111. What Electric Distribution System For Your Plant
112. The Management of Maintenance
113. Principles of Maintenance Control
114. Preplanning for Plant Location
115. Profit Sharing Plans in Industry
116. Maintenance Paperwork

1-49

MAIL THIS COUPON

Editor, FACTORY
330 West 42nd St., New York 18, N. Y.

Please send me ..... copies each of the reprints represented by the numbers circled, at 35¢ per copy. I enclose check ( ), money order ( ), for $ .....

Name .....

Address .....

City ..... State .....

3, 7, 9, 15, 38, 43, 45, 47, 64, 70, 78, 82, 86, 87, 90, 91, 93, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116

REDESIGNED COMPLETELY
for even greater economies

POWERED WITH
FORD
INDUSTRIAL ENGINE

SEE IT AT
BOOTH 520
MATERIALS HANDLING EXPOSITION
PHILADELPHIA
JANUARY 10-14

THE NEW SERVICE MO-TOW-LIFT 1949

NEW FEATURES

Exclusive Uni-Lever Control
Single lever located on steering column controls lifting and tilting mechanism

All Controls and Instruments Clustered in Front of Driver
An exclusive Mo-Tow-Lift advantage. Gives accurate control of every operation

Instant Maintenance Accessibility
Quick, easy removal of seat frame and side panels exposes engine and hydraulic controls. Loosening of six bolts allows inspection of operating mechanism.

• Always a top performer and now basically improved, MO-TOW-LIFT 1949 offers you more of everything — in performance, dependability, safety, low cost operation. MO-TOW-LIFT 1949 enables you to mechanize more of your materials handling jobs. Its greater payload efficiency cuts costs, its own maintenance expense is lower because many of the wearable parts are standard Ford parts. No other fork lift truck offers you all these advantages:

☆ **"Around-the-corner" service with famous Ford Industrial Engine** ☆ **Shortest turning radius for greater usability** ☆ **Enclosed upper hoist assembly lessens dirt abrasion in mast** ☆ **Extra safety from heavy-duty armor frame** ☆ **Adjustable posture seat for greater driver comfort.**

Before you invest in any fork lift truck get the facts on MO-TOW-LIFT 1949. Write for Bulletin . . . or see your Classified Telephone Directory for nearest distributor.

SERVICE CASTER & TRUCK CORP.

INDOOR RIDES Ride SAFELY and EASY

Executive Offices: Albion, Michigan
Plants at Albion, Michigan and Somerville 43, Mass.
See Your Classified Telephone Directory for Nearest Distributor

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

DETECTO-GRAM NEW PACKING SCALE
Another Detecto-Gram Scale for weighing your ingredients accurately. New Model #8800 brings to your heavy duty weighing jobs the mechanical accuracy previously found only in small scales. Capacity ¼ ounce to 60 lbs.
Write for Catalogue

DETECTO • SCALES • INC.
MAKERS OF FINE SCALES SINCE 1900
541F PARK AVE. • BROOKLYN 5, N. Y.
SCALE ENGINEERS IN ALL PRINCIPAL CITIES

MAILING LISTS THAT WORK . . .

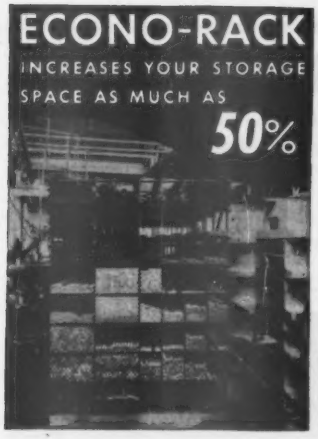
McGraw-Hill Industrial Mailing Lists are a direct route to today's purchase-controlling executives and technicians in practically every major industry.

These names are of particular value now when most manufacturers are experiencing constantly increasing difficulty in maintaining their own lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance during this period of unparalleled changes in industrial personnel. These lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nation-wide field staff, and are maintained on a twenty-four hour basis.

Investigate their tremendous possibilities in relation to your own product or service. Your specifications are our guide in recommending the particular McGraw-Hill lists that best cover your market. When planning your industrial advertising and sales promotional activities, ask for more facts or, better still, write today. No obligation, of course.

McGraw-Hill Publishing Co., Inc.
DIRECT MAIL DIVISION
330 West 42nd Street **New York, 18, N. Y.**



THE RUGGED, FLEXIBLE, MODERN STORAGE METHOD

For storage of bar steel, plates, palletized material, etc., Econo-Rack has a wide range of uses. Saves space, provides easy access of stock, simplifies inventory. **PROMPT DELIVERY.**

Write for descriptive bulletin ER-106 or ask for quotation based on your specific requirement.

ABELL-HOWE CO.

Engineers — Contractors — Manufacturers

53 W. Jackson Blvd., Chicago 4, Ill.

The Latest News of Science Now Yours in One Big Magazine!

Now at last you can keep up with the new inventions and discoveries of science that affect you and your industry. Every month *Science Illustrated* is filled with new advances in vital fields... Electricity, Construction, Aviation, Atomic Energy, Radio, Synthetics, Mining, Chemistry, Electronics, Home Appliances, etc.

Science Illustrated shows you new products and designs and explains *why*, *when* and *how* they were made. Every monthly issue is packed with 30 complete, authentic articles and 140 photographs, diagrams.

ORDER NOW AND SAVE $4!

You can order 36 big issues of *Science Illustrated* (3 full years) for ONLY $5! This special rate *saves you $4* over the one-year price. We'll start your subscription with the big new issue now on the press—*if you order within 10 days!*

MAIL THIS ORDER FORM TODAY!

Science Illustrated F-1-49
330 West 42nd Street, N. Y. 18, N. Y.

YES! I accept your special offer. Start my subscription to Science Illustrated with the new issue now on press.

☐ I prefer 2 yrs. at $4 (Saves me $2 compared with the 1-yr. rate)
☐ I prefer 3 yrs. at $5 (Saves me $4)
☐ I prefer 1 yr. at $3
☐ Bill me later ☐ Payment enclosed

Name_____

Address_____

City_____ Zone____ State_____

ALSO ON SALE AT ALL NEWSSTANDS . . . 25¢

RHOADS *Tannate* LEATHER BELTING

This 36" TANNATE belt driving a compressor in a salt company has been running at 6100 fpm carrying a variable load of 600-800 HP for more than seven years, almost continuously. A prior TANNATE belt performed six years on the same job. Other leather belts ran less than two years.

Rhoads TANNATE leather belts are built for such service. They are carefully manufactured from the raw hide to the finished belt designed for the specific job. TANNATE belts combine:

Maximum grip with minimum tension. You get more power transmitted with less wear on the bearings and belt.

High overload capacity. Top speeds are maintained even at peak load.

Great flexibility. TANNATE will operate over small pulleys at high speed.

Resistant to moisture, mineral oils and many chemicals. TANNATE transmits full load even when damp.

If you would like to know how TANNATE belting can benefit you—write us.

HYDRAULIC PACKINGS AND OTHER MECHANICAL LEATHER PRODUCTS

PRODUCERS OF FINE LEATHER FOR 246 YEARS

J. E. RHOADS & SONS

35 NORTH SIXTH ST PHILA 6 PA

NEW YORK • CHICAGO • ATLANTA

WHERE TO BUY

Featuring additional products, specialties and services for manufacturing plants

FLUX
for
SODERING
SILVER SODERING
WELDING
BRAZING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

TIME & FACILITIES AVAILABLE

- Complete Metal Fabrication
- Drawings, Stampings, Brakes
- Arc, Gas and Spot Welding
- Bonderite, High Bake Finishes
  Also Porcelain Work

WRITE OR CALL

ICE COOLING APPLIANCE CORP.
MORRISON, ILLINOIS

Est. 1878 — ORANGEVILLE — Ask For CATALOG
ALL TYPES **FLOOR TRUCKS** WHEELS CASTERS
ORANGEVILLE MFG. CO.
Orangeville (Col. Co.) Penna.

Renew Your Floors With
Tufcrete
RESURFACER
Write for complete information
TUFCRETE CO., DES MOINES 9, IA

INDUSTRIAL CONSULTANTS

Costs — Management — Inspections
Research — Accounting — Motion Studies
Consulting Services on Plant Management Problems

ASSOCIATED ENGINEERS, INC.
Joseph C. Lewis, Pres.
MANAGEMENT ENGINEERING
Plant Layout — Methods — Materials Handling — Incentive Compensation
330 East Berry St. — Fort Wayne 2, Ind.

READERS MAY CONTACT THE CONSULTANTS
Whose Cards Appear on This Page
with the confidence justified by the offering of these special services nationally.

MANAGEMENT & CONSULTANT ASSOCIATES
Time & Micro Motion Study; Incentives; Methods & Simplification; Job Evaluation; Layout; Inspections; Management.
Also: Market Research; National Contest Sponsorships.
23 Pierrepont St., Brooklyn 2, N. Y.

WALTER BEERMAN
Processing Processes
Manufacturing Processes
332 West 46 Street
New York 19

THE EMERSON ENGINEERS
Management Counselors Since 1899
Plans — Controls — Incentives
for
Profit Making Management
30 Rockefeller Plaza, New York 20, N. Y.

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
Time and Motion Study — Job Evaluation
Wage Incentive — Merit Rating
Installations — Training
322 Wood Street — Pittsburgh (22), Pa.

A. J. BOYNTON AND COMPANY
Engineers and Technical Counselors
Designers and Builders of Industrial Plants and Equipment
68 East Washington Street — Chicago 2, Illinois

GEMAR ASSOCIATES
Materials Handling Consultants
Plant Layout — Packaging
Production Handling
Greenwich — Connecticut

ALLAN H. MOGENSEN
DIRECTOR
Work Simplification Conferences
330 W. 42nd Street, New York City — Box 30, Lake Placid, N. Y.

WALLACE CLARK & COMPANY
MANAGEMENT CONSULTANTS
Since 1920
521 Fifth Avenue — New York 17, N. Y.

WILLIAM HIGGINSON & SON
Industrial Engineers
Plant Layouts — Designers
Investigations, Appraisals, Site Planning, Consultants, Construction Supervision
101 Park Avenue, New York

CARL A. STEVENS
Professional Engineer
Investigations — Designs — Engineering for Manufacturing and Processing Plants in OKLAHOMA AND THE SOUTHWEST
Special Service to Small Industries
3012 E. 15th Street — Tulsa 4, Oklahoma

GREGORY M. DEXTER, C.E., M.E.
Consulting Engineer
Longacre 4-3881
Empire State Building, New York 1, N. Y.

LANCASTER, ALLWINE & ROMMEL
Registered Patent Attorneys
Patent Practice before U.S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request.
Suite 427, 815—15th St., N.W., Washington 5, D.C.

STOCKER ASSOCIATES, INC.
Consultants in Materials Handling and Plant Layout
Over 20 Years Experience
40 Exchange Place
New York 5, N. Y.
Boston — San Francisco — Chicago

How to develop

MORE EFFICIENT OPERATING PROCEDURES

for office and plant

● This book shows you how to set up time-saving methods for every regular function in your office and plant. It gives you proven procedures for breaking down each type of work into its step-by-step movements . . . and describes practical techniques for eliminating costly waste motion. Any manufacturer, superintendent, or foreman can put this book to work in developing standards that improve existing methods, help determine effective production operations, and serve as a guide in designing products for economical output.

Shows how to establish time standards — estimate time for new methods

Here's an entirely new approach to the problem of measuring time in manufacturing operations. This new method enables you to make accurate time estimates for a complete set of movements comprising any proposed job . . . evaluate different methods . . . and alter product design while still in the blueprint stage.

JUST PUBLISHED!

METHODS-TIME MEASUREMENT

By HAROLD B. MAYNARD
President, Methods Engineering Council

G. J. STEGEMERTEN
General Manager, Methods Engineering Council

JOHN L. SCHWAB
Division Manager, Methods Engineering Council

290 pages, scores of illustrations, charts, and graphs, $3.75

This book describes techniques for application of time-measurement to every motion without previous use of the stop watch, giving you concrete answers to problems of efficient, low-cost production. It tells you what the basic movements are, how to observe them, and how to take positive steps toward money-saving production methods.

CONTENTS

1. Methods Engineering
2. Methods—Time Measurement
3. Development of Data
4. Methods—Time Tables
5. Reach
6. Move
7. Turn
8. Grasp
9. Position
10. Release Load
11. Disengage
12. Walking
13. Other Motions
14. Principles of Limiting Motions
15. Accuracy of Standards
16. Elements of Measurement
17. Information and observation
18. Computation
19. Estimating from Drawings
20. Principles of Motion Economy
21. Analysis and Development
22. Principles of Economical Methods
23. Installation of Improved Methods
24. Simplified Data
25. Tool Design
26. Office Methods
27. Formula Derivation
28. Assembly Procedures
29. Performance Rating

SEE IT 10 DAYS FREE

McGRAW-HILL BOOK CO., 330 W. 42nd St., NYC 18

Send me Maynard, Stegemerten, and Schwab's **Methods-Time Measurement** for 10 days' examination on approval. In 10 days I will remit $3.75, plus a few cents postage, or return book postpaid.*

Name .....

Address .....

City ..... Zone..... State.....

Company .....

Position Fac-1-49

*We pay mailing costs if you send cash with this coupon. Same return privilege.

NALCO

heavy duty CARBON LAMPS **LAST LONGER**

ESPECIALLY DESIGNED for INDUSTRIAL USE

- EXIT LIGHTS
- SIGNAL LIGHTS
- PILOT LIGHTS
- TEST LAMPS

Nalco Carbon Lamps are setting records of *extra* hours of service—wherever they're used—because they're engineered for rugged industrial performance. Actual tests in use prove their long-life superiority where inductive kick-back can feed into the lamp circuit. And where vibrations are constantly incurred, Nalco Carbon Lamps pay for themselves through longer, trouble-free service, fewer bulb replacements.

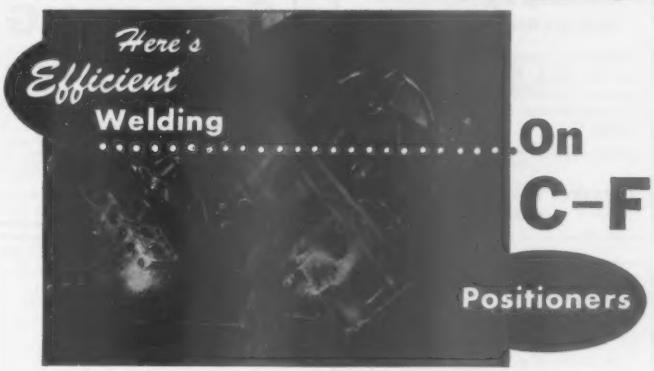
There's A NALCO Carbon Lamp For Your Every Need:
Standard types, shapes, sizes and colors are available, as well as special shapes, colors and construction features. Standard screw and special bases are supplied according to your needs.

Send for catalog sheets and price lists.

NALCO INFRA-RED ORTHERM

NORTH AMERICAN *Electric Lamp Co.*

1044 Tyler St. **St. Louis 6, Mo.**



When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand—that's efficient welding!

Weldors spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP24—an illustrated circular detailing the specific advantages of C-F Positioners.

CULLEN-FRIESTEDT CO.

1321 S. KILBOURN AVENUE **CHICAGO 23, ILLINOIS**

Valuable Help for You

and your

SUPERVISORY STAFF

in

FACTORY'S PLANT OPERATION LIBRARY

Reprints of some of FACTORY'S best recent articles on a wide variety of

PRODUCTION, MAINTENANCE AND LABOR SUBJECTS

For complete list, see page 297

FACTORY MANAGEMENT AND MAINTENANCE

WANTED
MECHANICAL ENGINEER

Midwestern cement company has opening for young Mechanical Engineer for general engineering design and construction. Experience in cement industry desirable.

Submit complete resume of qualifications and salary desired.

Petoskey Portland Cement Co.
Petoskey, Michigan

Exceptional Opening for SALES ENGINEER

to cover Mid-West Metalworking Industry

Selling Experience Desirable
But Not Essential

Nationally known manufacturer of fastening devices wants man to advise customers on applications—not take orders—working in midwest with headquarters preferably in St. Louis or Kansas City. Salary to be commensurate with experience.

Requirements: Varied knowledge of metalworking production gained by plant work or selling; ability to travel extensively away from home. Write in detail about background. Interview arranged at New York headquarters; expenses paid.

RW-7295, Factory Management & Maintenance 330 West 42 Street, New York 18, N. Y.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : Used or Resale
BUSINESS : : EQUIPMENT

UNDISPLAYED —RATES— DISPLAYED

(Not available for equipment advertising)

$1.50 a line, minimum 4 lines to figure, advance payment, allow 5 average words as a line.
Positions Wanted (full or part time salaried employment only), ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.
Individual Spaces with border rules for prominent display of advertisements.
The advertising rate is $15.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

REPLIES (Box No.):
Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

PRODUCTION SUPERINTENDENT, Engineering Graduate experienced in Heavy Processes such as Paper or allied operations. Must have good record in management and control of cost factors and be able to assume supervision of large production unit. Age preference 35 to 40 yrs. Location Middle West. P-7078, Factory Management & Maint.

ENGINEERS: LARGE college offers $3000 approx. half time teaching-studying. All ranks univ. positions, experienced $4500-$6500 nine months. Give phone, photo, qualifications. Cline Teachers Agency, East Lansing, Mich.

GENERAL FOREMAN, Paper manufacture, particularly experienced in processing thin papers involving beaters and paper machine operation, being capable of directing tour foreman and coordinating general manufactiuring activities. Eastern location. P-6914, Factory Management & Maint.

CHIEF MAINTENANCE Mechanic—Take complete charge maintenance large bread and cake bakery. Metropolitan N. Y. area. Crew of 8 men. Give exp. salary expected. All replies in strict confidence. P-7419, Factory Management & Maint.

SHOP SUPERINTENDENT

Large urban transit company is seeking Superintendent to take charge of central overhaul shop. All common crafts and trades represented among several hundred employes. Excellent opportunity with stable company for man who can direct work effectively, increase production, improve work methods and deal with organized labor. Salary commensurate with proven ability. Replies treated in confidence. Please submit complete resume of background and qualifications to:

P-7396, Factory Management & Maintenance 330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

INDUSTRIAL OR mechanical engineer experienced in modern factory methods for production department of large newspaper in eastern city. Salary will depend on experience and ability. Send resume of experience and personal history to P-7465, Factory Management & Maint.

(Continued on page 303)

SEARCHLIGHT SECTION

SALARIED POSITIONS $3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, Inc., 276 Dun Bldg., Buffalo 2, N.Y.

Salaried Positions $3,600 Up

Our service is open for men who have initiative and ability with a good background in all fields of industry. No fee or registration charge is made until placed. State fully your qualifications.

GLOBE EMPLOYMENT SERVICE
42 South 15th St. Phila. 2, Pa.

EXECUTIVES AND TECHNICAL MEN

Desiring Positions with Stability

We solicit inquiries from qualified candidates who desire to contact employers for positions paying to $25,000 per year. Confidential. Est. 31 years.

(Inquiries from Employers entail no obligation)

THE NATIONAL BUSINESS BOURSE
39 W. Jackson Blvd., Chicago 4

CLEVELAND VOCATIONAL BUREAU
317 SCHOFIELD BLDG., CLEVELAND, OHIO
MAIN 6700

Foundry Supt. Grey Iron $7500
Division Supt. Machinery $7000
Industrial Engineers: many $6500
Plant Engineer full charge $7200

Specializing in executive and technical positions. Inquiries strictly confidential.

(Continued from page 302)

EMPLOYMENT SERVICES

SALARIED PERSONNEL $3,000-$25,000. This confidential service established in 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D. 241 Orange St., New Haven, Conn.

EXECUTIVES—CONTEMPLATING A change? Your personal requirements met thru our flexible procedures, affording full protection of your present position. We have the knowhow and the nationwide contacts to negotiate successfully for you. Details for the asking, mailed under confidential cover. Jepson Executive Service, 1042 Porter Bldg., Kansas City 2, Mo.

POSITIONS WANTED

PRODUCTION OR manufacturing engineer. Broad experience in metal working industry, operational processes, tooling line production and jobbing. Now Chief Engineer. Engineering training and shop experience. Age 44, Aggressive, cost minded. PW-7066, Factory Mang't & Maint.

PRODUCTION ENGINEER: Now employed desires new position. Preferably in Plastic Industry. Over five years experience in Plastic Engineering. Background includes, plant layout, production control, material control, time and motion study, drafting and designing. Young and aggressive. Technical college graduate. PW-7267, Factory Management & Maint.

CONTROLLER, CREDIT Mgr., Office Mgr., college education and excellent background in accounting and business administration. Now engaged as Assistant Treasurer with manufacturing company. Good references. PW-7358, Factory Management & Maint.

FOREMAN, 6 yrs. mechanical experience, capable of assuming responsibility and supervision of assembly department desires position in Greater New York. PW 7374, Factory Manag't & Maint.

INDUSTRIAL ENGINEER, 27, garment background (eighteen months with dress manufacturer, eighteen months with management engineer). Wharton MBA graduate, knowledge of accounting and statistics, Veteran, single, will relocate anywhere. PW-7397, Factory Management & Maint.

INDUSTRIAL ENGINEER or assistant production manager—experience and special training in cost control, production engineering, methods, and production control in metal trade. Graduate. Age 27. Abstract on request. PW-7392, Factory Management & Maint.

MANUFACTURERS EXECUTIVE — Eighteen years well rounded experience. Industrial engineering background. Age 39. Now in Chicago, prefer smaller community. Full information to responsible parties. PW-7378, Factory Management & Maint.

PERSONNEL AND LABOR RELATIONS ADMINISTRATOR

Eight years experience in labor management with large organizations manufacturing chemicals, electrical equipment, textile machinery, and foundry parts. Have supervised planning, coordination, and operation of recruitment, training, wage and salary administration, incentive plans, personnel research, records, safety, recreation, economic security, etc. Experienced in contract negotiation and working with legal counsel concerning labor laws and collective bargaining. Have handled public relations on policy basis. Prefer location in South or Midwest. Reply:

PW-7115, Factory Management & Maintenance
1311 Rhodes-Haverty Bldg., Atlanta, Ga.

Available Industrial Engineer

28 years experience. Plant layout, methods, wage incentives, Routing & forms control. References furnished. Will take temporary or permanent position.

PW-7460, Factory Management & Maintenance
330 West 42 Street, New York 18, N. Y.

POSITIONS WANTED

PLANT MANAGER, steel products or other, to be available. Established or branch plant or enterprise. PW-7376, Factory Management & Maint.

PRODUCTION ENGINEER — production planning and control from foundry to final by graduate engineer with ten years background in operations. PW-7254, Factory Management & Maint.

GALVANIZER—20 years experience. Can make plant layout, design tools and equipment for processing any product. Capable manager with proven ability. Salary high. PW-7337, Factory Management & Maint.

INDUSTRIAL ENGINEER—Diversified experience in general manufacturing, machining, stampings, all types of assemblies, wage incentives, job evaluation, installation of controls, human relations training. Have managed small plants. Experience with industrial management consultants. Desire position in supervisory capacity leading ultimately to executive position. Salary open. Plenty of references. PW-7334, Factory Management & Maint.

INDUSTRIAL ENGINEER Consulting and staff engineer experience on wage incentives—direct, indirect,—supervision; plant layout; methods; production scheduling and control; job evaluation. Desires permanent location with progressive firm. Family. Veteran. PW-7466, Factory Management & Maint.

SPECIAL SERVICES

Time Study Forms, boards, stop-watches. Forms shipped from stock, or your forms duplicated. Write for prices. Oznam Products, 5542 So. Homan Ave., Chicago 29, Ill.

GRAY IRON CASTINGS

Open capacity available 100-10,000 lbs. Specializing in rolls cylinders—Shell bodies

C. B. COTTRELL & SONS COMPANY
WESTERLY, RHODE ISLAND

WANTED
AIR COMPRESSORS
Stationary — 100 Cfm and Up
Portable — 2 Stage Only
L. W. BAUER
North Bergen, N. J.

TRANSFORMERS FOR SALE

3— 3 KVA W-H 13200-120/240
12— 5 KVA W-H 13200-120/240
4— 10 KVA W-H 13200-120/240
1— 15 KVA W-H 13200-120/240
3— 25 KVA W-H 13200-120/240
3— 25 KVA Mol 13200-120/240
10— 37½ KVA W-H 13200-120/240
2— 25 KVA W-H 13200-2400
2— 37½ KVA Mol 13200-2400/4160Y
3— 75 KVA W-H 13200-120/240
3— 75 KVA G-E 13200-120/240
1— 75 KVA Mol 13200-2400
1—100 KVA W-H 13200-2400
10— 1½ KVA Wag 7200-120/240 "REA"
2— 5 KVA G-E 4800-120/240
4— 5 KVA W-H 2400/4800-120/240
4— 7½ KVA W-H 4800/8320Y-120/240
1— 25 KVA Mol 2400/4800-120/240
3— 50 KVA W-H 4800/8320Y-120/240
3— 50 KVA G-E 26400-2300/4000Y
3— 50 KVA G-E 23000-2400/4160Y
3—100 KVA G-E 23000-2400/4160Y
3—200 KVA Pitts 26400-2300/4000Y

TRANSFORMERS WANTED
Rewind and repair service on all makes of transformers.

THE ELECTRIC SERVICE CO.
CINCINNATI 27, OHIO

COMPRESSORS
Vacuum Pumps
New & Guaranteed Rebuilt
Stationaries for Permanent Installation

PORTABLES
SALE OR RENTAL
For Standby Service or Demolition Work

AFTERCOOLERS
AIR RECEIVERS
ACCESSORIES

AMERICAN AIR COMPRESSOR CORP.
4700-4800 Dell Ave. N. Bergen, N. J.
N.Y. Phone, Ch. 4-7665. N. J. Phone, Union 5-4848

One (1) Scott, Model I.P.2
SERIGRAPH TESTING MACHINE
Will consider reasonable offer.
ALL AMERICAN AIRWAYS, INC.
210 Greenhill Ave. • Wilmington 99, Delaware

FOR SALE

1 Lehmann #424F—4 roll water cooled refiner, rebuilt by J. M. Lehmann Co. Never used. Inspection invited. Make offer.

M & M LTD.
200 No. 12th St., Newark 7, N. J.

FOR SALE

Two Practically new Ingersoll-Rand, floor type, Blowers model #20G1415; equipped with direct drive, 15 H.P., Westinghouse motors, 220/440 V. 3/60AC, R.P.M. 3450. Blower specifications: 1,800 C.F.M.; discharge pressure 1¼ lb.; R.P.M. 3,480; overall dimensions: 44" W. x 56" H. x 30" deep.

CARNEY-PACIFIC ROCKWOOL CO.
P. O. BOX 1077 LONGVIEW, WASHINGTON

Index To Advertisements

Abell-Howe Company 299
Acme Steel Company 198
Aerol Company 55
Air Express Div., Railway Express .. 282
Alemite Div., Stewart-Warner Corp. 153
Allegheny-Ludlum Steel Corp. 231
Allen Co., Inc., L. B. 300
Allied Products Corp. 63, 278
Allis-Chalmers Mfg. Co. 9, 29, 163
Aluminum Co. of America 273
Alvey-Ferguson Company 254
American Abrasive Metals Co. 278
American Baler Company 260
American Blower Corporation .. Insert 16B
American Brake Shoe Co.
(National Bearing Div.) 255
American Brass Company 249
American Crayon Company 256
American Gas Association 34
American Hoist & Derrick Co. 290
American Hot Dip Galvanizers Assn. 246
American Monorail Company 42
American Optical Company 32
American Pulley Company 226, 285
American Screw Company 17
American Structural Products
Co. 185, 227
Anaconda Wire & Cable Co. 237
Anchor Post Fence Div.,
Anchor Post Products, Inc. 38
Appleton Electric Company 202
Aro Equipment Corporation 190, 252
Arrow, Hart & Hegeman
Electric Co. 45
Automatic Transportation Co. 15

Baker-Raulang Company 7
Baldwin-Duckworth Div.
Chain Belt Co. 155
Baldwin-Hill Company 60
Bassick Company 187
Bell Aircraft Corporation 41
Benjamin Electric Company 58
Binks Manufacturing Co. 166
Blanchard Machine Co. 279
Boston Gear Works 216
Boston Woven Hose & Rubber Co. .. 49
Brown & Sharpe Mfg. Co. 43
Bull Dog Electric Products Co. 189
Bunting Brass & Bronze Co. 36
Buschman Company, E. W. 206
Bussman Manufacturing Company .. 30, 31
Byers Company, A. M. ..... 2nd Cover
Byers Machine Company 162

Cambridge Wire Cloth Co. 158
Central Screw Company 173
Century Electric Company 207
Chicago Pneumatic Tool Company .. 259
Chisholm-Moore Hoist Corp. 168
Clark Equipment Co.,
Industrial Truck Div. 18, 19
Cleveland Crane & Engineering
Co. 12, 13, 217
Columbus-McKinnon Chain Corp. 174
Cone Automatic Machine Company .. 263
Continental Screw Company 173
Coppus Engineering Corporation 205
Corbin Screw Company 173
Crescent Insulated Wire & Cable Co. 178
Crescent Truck Co. 170
Cullen-Friestedt Co. 301

Darnell Corporation, Ltd. 176
Day-Brite Lighting Co. 258
Dayton Rubber Co. 20, 21
DeLaval Steam Turbine Co. 225
Delco Motors Div., General Motors .. 221
Delta Manufacturing Co. 271
Detecto Scales, Inc. 298
De Vilbiss Company 171
Dodge Corporation, F. W. .. 236, 250, 264
Dodge Manufacturing Corp. 48
Dow Chemical Co. 169
Dracco Corporation 276
du Pont de Nemours & Co., E. I.
(Rayon Division) 215

Eastman Kodak Company 277
Economy Engineering Co. 270
Edison Storage Battery,
Div. Thomas A. Edison Co. 204
Electric Controller & Mfg. Co. 180
Electric Storage Battery Co. 147
Elwell-Parker Electric Co. 10

Factory Management & Maintenance 297
Farr Company 232
Fastener Corporation 186
Fedders-Guigan Corp. 222
Federal Products Corp. 59
Fenwal, Incorporated 291
Finnell System, Inc. 233
Fiske Bros. Ref. Co., Lubriplate Div. 286
Flexible Steel Lacing Co. 286
Foote Bros. Gear & Machine Corp. .. 191
Fulton Sylphon Division 47

Gardner Denver Co. 241
Gast Mfg. Corp. 172
Gates Rubber Company 44
General Box Company 196
General Electric Company 35, 61, 235
General Electric Co.
(Electronics Dept.) 6
General Electric Co.
(Lamp Dept.) 223
Gifford-Wood Co. 257
Goodrich Company, B. F. 1
Gould Storage Battery Co. 195
Grant Gear Works, Inc. 222
Graybar Electric Company 5
Grover Company 28
Gulf Oil Company 37

Hansen Manufacturing Co. 201
Harnischfeger Corporation 33
Harper Company, H. M. 173, 269
Haskelite Mfg. Co. 183
Hein-Werner Corp. 194
Hewitt Rubber Div.,
Hewitt-Robins, Inc. 52
Hines Lumber Co., Edward 209
Hyatt Bearings Div.,
General Motors Corp. 151

Ice Cooling Appliance Corp. 300
Independent Pneumatic
Tool Co. 266, 267
Industrial Brownhoist Corp. 283
Industrial Control Div.,
Square D Company .. 23, Third Cover
Ingersoll-Rand 161
International Exposition Co. 262
International Screw Company 173

Jeffrey Mfg. Co. 165
Jenkins Bros. 179
Johns-Manville Corporation 268
Johnson Bronze Company 220
Joy Manufacturing Co. 193

Kester Solder Company 32A
Kex National Service 184
Kidde & Co., Inc., Walter 293
Kimberly-Clark Corporation 53
Klemp Company, Wm. 256

Lamson Corporation 242
Lamson & Sessions 173
Le Tourneau, Inc., R. G. 157
Lewis-Shepard Products, Inc. 238
Link-Belt Company 8
Logan Company 200
Lubriplate Div.,
Fiske Bros. Ref. Co. 286
Lukens Steel Company
(Lukenweld Div.) 54
Lunkenheimer Company 188
Lyon Metal Products Co. 281

M & H Valve & Fittings Co. 270
Macmillan Company, The 274
MacRaes Blue Book Company 284
Mahon Company, R. C. 40
Manning, Maxwell & Moore, Inc. 264
Masonite Corporation 14
Master Electric Company 175
Materials Handling Exposition 16
McCaskey Register Company 228
McGraw-Hill Book Co. 296, 301
Mercury Manufacturing Co. 50
Micro-Switch Corp. 295
Mierson Products Co. 274
Milford Rivet & Machine Co. 294
Miller Company 46
Morse Chain Company 306

National Bearing Div.,
American Brake Shoe Co. 255
National Electric Products Corp. 247

National Lock Company 173
National Screw & Mfg. Co. 214
Nicholson File Company 181
Niagara Blower Company 182
North American Electric Lamp Co. 301
Norton Company 229

Olson Mfg. Co., Inc., Samuel 212
Orangeville Mfg. Co. 300
Orton Crane & Shovel Co. 287
Osborn Manufacturing Co. 4
Owens-Corning Fiberglas Corp. 62

Pangborn Corporation 280
Pannier Corporation 240
Parker-Kalon Corporation 173
Patent Scaffolding Co., Inc. 258
Pawtucket Screw Company 173
Penn Rivet & Machine Co. 294
Pettibone-Mulliken Corporation 57
Phillips Screw Manufacturers 173
Phoell Mfg. Co. 173
Pittsburgh Gear Company 230
Pittsburgh Plate Glass Company (Brush Division) 22
Pittsburgh Steel Products Co. 213
Pittsburgh Valve & Fittings Corp. 239

Ransburg Electro-Coating Corp. 230
Reading Chain & Block Corp. 294
Reading Screw Company 173
Ready Power Company 288
Redington Company, F. B. 274
Reeves Pulley Company 32B-C
Remington Rand 203
Reznor Manufacturing Co. 240
Rhoads & Sons, J. E. 299
Richards-Wilcox Mfg. Co. 167
Roots-Connersville Blower Corp. 149
Russell, Burdsall & Ward Bolt & Nut Corp. 275
Ryerson & Son, Joseph T. 2

Science Illustrated 299
Scovill Mfg. Co. 173
Seamless Rubber Company 296
Service Caster & Truck Corp. 298
Sexauer Mfg. Co., Inc., J. A. 230
Shakeproof, Inc. 173
Shepard-Niles Crane & Hoist Corp. 208
Sherwin-Williams 210
Silent Hoist & Crane Co. 236
Simonds Saw & Steel Co. 251
Skilsaw, Inc. 265
Southington Hdwe. Mfg. Co. 173
Square D Company ..... 23, Third Cover
Standard Conveyor Company 24, 25
Standard Oil of Indiana 199
Stanley Works 234
Steel Company of Canada, Ltd. 173
Sterling Bolt Company 173
Stonhard Company 305
Strom Steel Ball Company 290
Stronghold Screw Products 173
Sunnen Products Company 197
Sun Oil Company 26, 27
Surface Combustion Corp. 218
Sweet's Catalog Service 236, 250, 264

Tennant Co., G. H. 160
Texas Company 64
Thermoid Company 243
Thomas Flexible Coupling Co. 224
Thomas Truck & Caster Co. 260
Thompson & Son Co., Henry G. 272
Timken Roller Bearing Co. Fourth Cover
Titeflex, Inc. 236
Toledo Scale Company 192
Torit Manufacturing Co. 178
Towmotor Corporation 56
Trane Company 164
Trumbull Electric Co. 289
Truscon Laboratories ..... Insert 16A
Tufcrete Company 300

Uarco, Incorporated 32D
Udylite Corporation 51
Union Chain & Mfg. Co. 253
Unistrut Products Co. 292
U. S. Steel Subsidiaries 261
U. S. Steel Supply Co. 261

Valley Electric Corporation 256
Van Dorn Electric Tool Co. 11

Wagner Electric Company 211
Westinghouse Electric Corp. 244, 245
Wheeler Insulated Wire Co., Inc. 250
Wiegand Co., Edwin L. 219
Wiley & Sons, Inc., John 270
Wilshire Power Sweeper Co. 301
Wilson Inventory Management Activities, Inc. 296
Wing Mfg. Co., L. J. 248
Wolverine Bolt Co. 173
Worthington Pump & Mchy. Corp. 39
Wright Hoist Division, American Chain & Cable Co. 159

Yale & Towne Mfg. Co. 177

■

INDUSTRIAL CONSULTANTS 300

■

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT
Positions Vacant 302
Selling Opportunities Offered 302
Positions Wanted 303
Employment Services 303

SPECIAL SERVICES
Contract Work 303

EQUIPMENT
(Used or Surplus New) For Sale 303

WANTED
Equipment 303

There's no need to rip up your old floor . . .

patch or resurface with

STONHARD RESURFACER

No matter how badly worn or rutted—anyone can quickly and easily patch or resurface any floor with STONHARD RESURFACER. And if your floors are rotted and splintered you can have a perfectly smooth, easy-to-work-on floor over a week-end. It will reduce accidents, increase efficiency, reduce fire hazard, lower maintenance costs. It will pay you to find out why practically every industry, public utility, and railroad uses STONHARD RESURFACER.

Send for FREE Resurfacer Folder.

STONHARD RESURFACER

Building Maintenance Materials Since 1922

103 Stonhard Bldg., 1306 Spring Garden St., Philadelphia 23, Pa.

STONHARD COMPANY
103 Stonhard Building, 1306 Spring Garden St.
Philadelphia 23, Pa.

Please send me a FREE copy of "Resurfacer Folder"

Firm .....

Mr. .....

Address .....

City ..... Zone ..... State .....

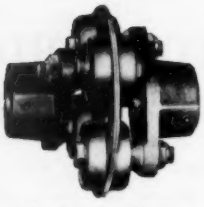
"Keep me for reference"

Here's your quick reference file for Morse Mechanical Power Transmission Products

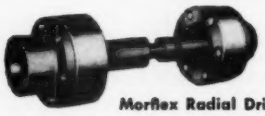
As a purchasing engineer, design engineer or maintenance man — here's help in getting the best in mechanical power transmission. In making your choice, use this handy check list of the basic Morse Chain line—the finest mechanical power transmission products available.

There are 20 Morse branches capable of giving expert engineering counsel on power transmission problems.

MORSE
MECHANICAL POWER TRANSMISSION PRODUCTS
A PRODUCT OF B-W BORG-WARNER

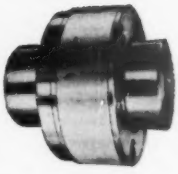


Morflex Couplings

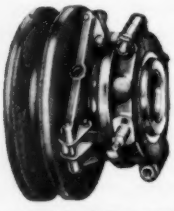


Morflex Radial Drive Shafts

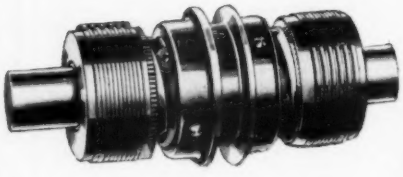
Morflex Drive Shafts



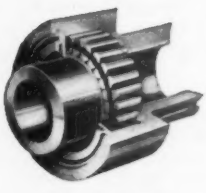
Morflex Radial Couplings



Morse-Rockford Over-Center Friction Clutches

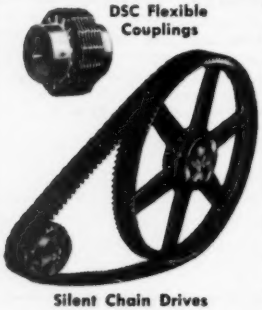


Morse-Rockford Pullmore Clutches



Morse-Formsprag Over-Running Clutches

DSC Flexible Couplings



Silent Chain Drives

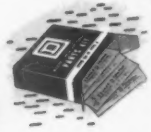
DRC Flexible Couplings

Roller Chain Drives

NOTE: **Distributors—there's one near you—carry stocks from which quick deliveries can be made. Write Dept. 280, Morse Chain Company, 7601 Central Avenue, Detroit 8, Mich., for further information about any or all products.**

Even the *Best* MOTOR STARTERS Need Inspection and Maintenance

ALL starters require periodic contact replacement under conditions of heavy load or frequent operation. Some may require magnet coil exchange to match voltage and frequency of power supply. That's why Square D has always stressed accessibility—simplifying installation, inspection and normal maintenance.



NEW "OFF-THE-SHELF" PARTS KITS MAKE NORMAL MAINTENANCE EASIER THAN EVER!

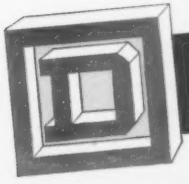
• Now, replacement parts for Square D starters are packaged in easy-to-stock kits. Each kit contains parts necessary to replace all load contacts on two or three-pole starters. Parts are individually packaged in clearly labeled envelopes. An illustrated service bulletin is enclosed to provide quick parts identification and complete installation instructions.

***Write** for Bulletins 8536 and 9998. Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin*

Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.

Remove two more screws and entire armature and movable contact assembly can be lifted off. Disconnect two wires from screw-type terminals and slip off magnet coil.

Contacts are attached with separate screws—can be removed and replaced without disturbing any wiring. Screwdriver is only tool needed.



SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

The operator gets a lift, too— with Timken® bearing equipped Transitier

IN the Transitier lift truck manufactured by Transitier Truck Company, Portland, Oregon, the steering mechanism, mounted on Timken bearings, operates freely even under the heaviest loads. Results: easier steering—less fatigue for drivers—more efficient operation. Timken tapered roller bearings are also used on the differential and pinion shafts for smooth, dependable operation and greater endurance.

Timken roller bearings have great load-carrying capacity due to the line contact between rolls and races. They're made from the finest steel ever developed for tapered roller bearings—Timken fine alloy steel. And they normally last the life of the machine in which they are used.

With Timken bearings, close-fitting closures can be used to retain lubricant and keep out dirt. Their true rolling motion and incredibly smooth surface finish enable Timken roller bearings to operate freely, frictionlessly. Their tapered construction carries any combination of radial and thrust loads.

Backed by 49 years of bearing research and development, Timken tapered roller bearings are first choice throughout all industry. No other bearing can bring you *all* the advantages you get with Timken bearings. Look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN ROLLER BEARING CANTON *This symbol on a product means its bearings are the best.*

TRANSITIER LIFT TRUCK
gets easier steering, more dependable operation with Timken bearings on steering spindle, differential and pinion shafts.
Transitier
Trans

POSITIVE ROLLER ALIGNMENT

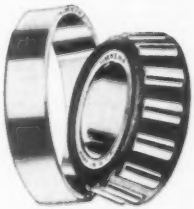
Wide area contact between roll ends and rib of the cone prevent Timken roller bearings from skewing. Result: bearings roll easier, last longer.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▯ LOADS OR ANY COMBINATION ◎